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CACAO PODS AND THEIR SEED.

(By J. B. Carruthers, F.L.S.)

CACAO is grown for its seed, and the value of the fruit depends upon the quality and weight of the seed contained in it.

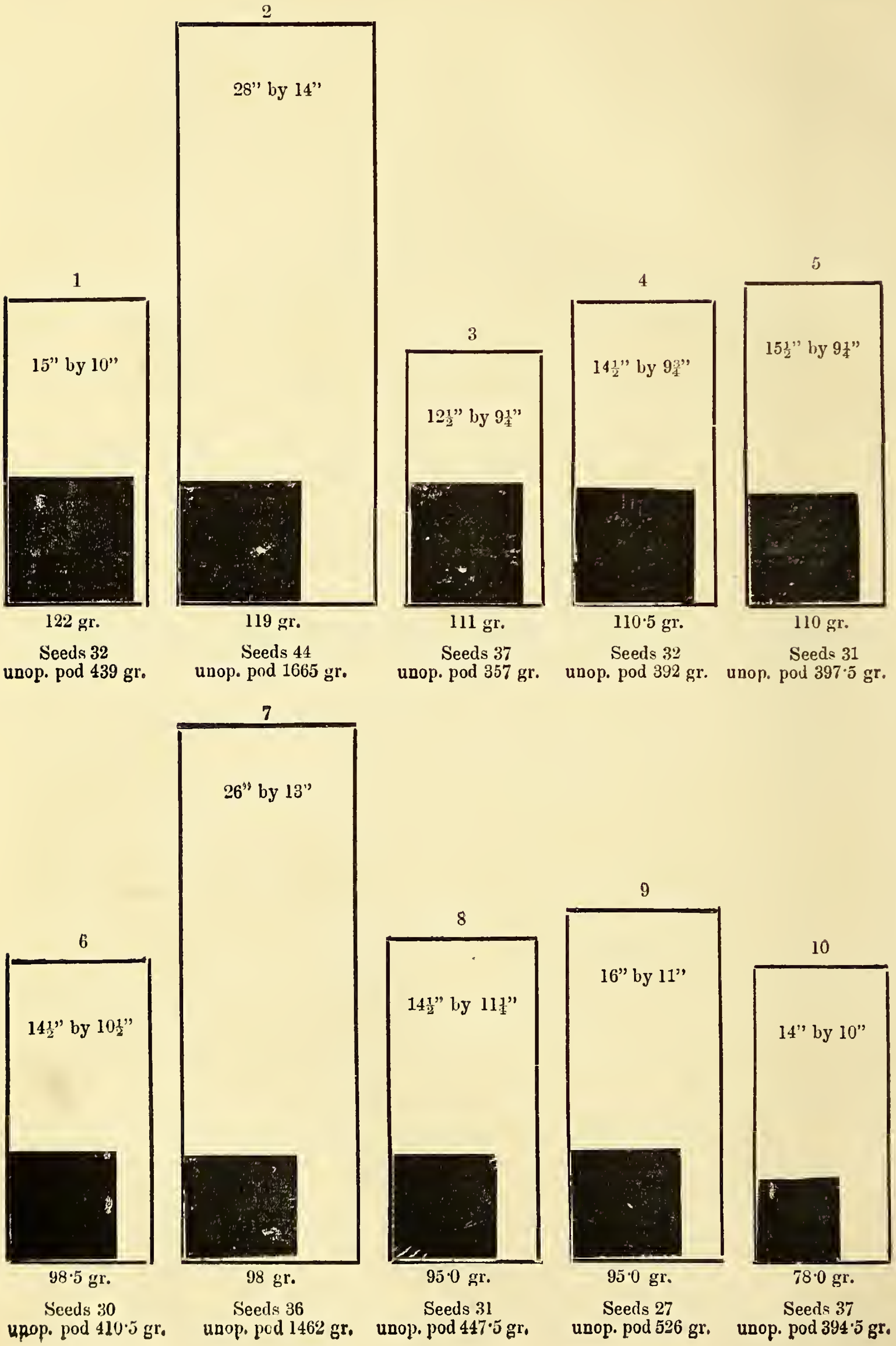
In selecting Cacao pods for seed planting, it is important to know if any external characteristics can be used as guides. As a rule, in Ceylon, Cacao planters have their individual methods of selection by colour, shape, size or other character. Thus, one man chooses the biggest pods, another the longest which have a knobby fruit wall, another those of a certain shade of colour.

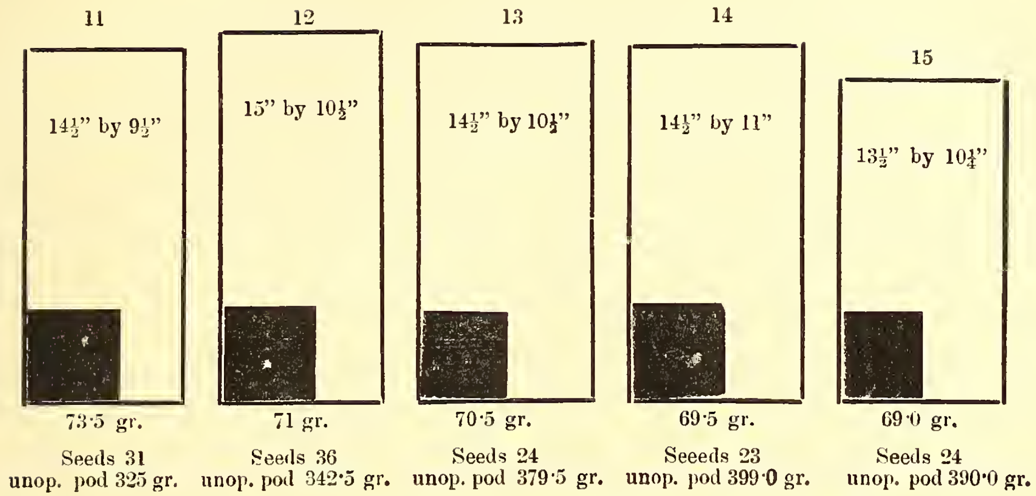
In order to test the value of characters such as these, I have begun to measure and weigh a series of pods of different varieties, grown under varying conditions, and so far as my experiments have gone (only to the examination of some two or three hundred), the characters of size and weight of the fruit do not afford any criterion of the weight of contained seed, which is the only consideration to the planter growing Cacao for the market.

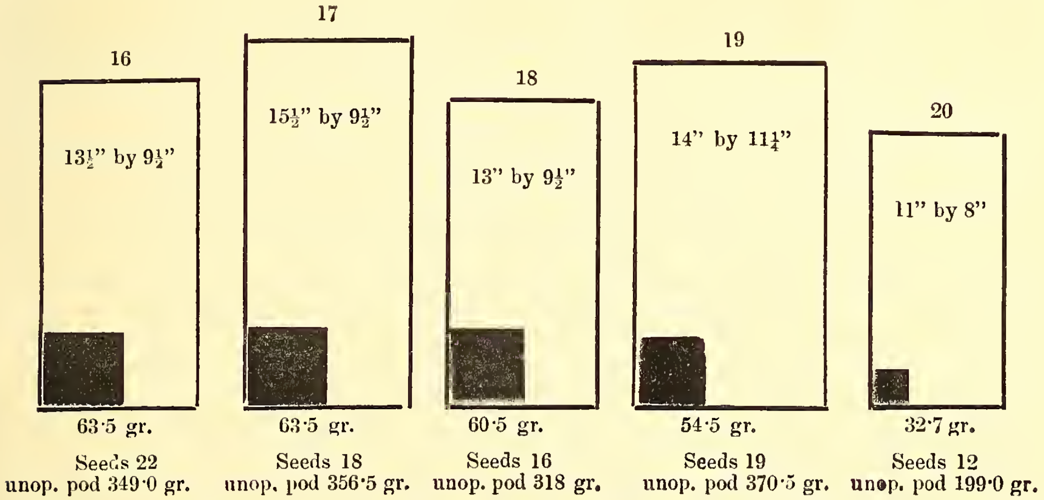
The diagrams (pp. 656-657) are drawn to scale, and they show so far as they go that the size of the fruit is due chiefly to the thickness of the fruit wall and gives no clue to the number or weight of the seeds in the pod.

The investigation of these and other pods points to the uselessness of any selection of pods for seed by external appearance. A more hopeful method and one calculated to improve the Cacao plant, is the selection of seed from parents possessing marked advantages over their fellows, such as abnormally large and regular production of fruit, *i.e.*, large number of pods on the tree or large number of heavy seeds in the pod, hardiness against varying conditions, production of fruit at a suitable dry season of the year, quickness in growing to maturity and the fruit-producing period. These and similar advantageous qualities in parents should by selection be perpetuated as far as possible.

When a larger number of records of these measurements and weights of the fruit of Cacao have been collected, more definite knowledge will be gained as to methods of selection by fruit characters. The diagrams, however, of these twenty fruits will perhaps induce planters to make such observations, and so gain information as to the nature of the Cacao pod which would give the best return to the cultivator and the least waste, so that selection should be carried on in the right direction. The waste material in pods 2 and 7 is in the proportion of 13 to 1, whereas in 1, 3 and 4 it is less than 4 to 1. The magnificent proportions of pods like these two (2 and 7) must be considered in the calm light of the commercial value of the seeds which at once brings them on a level with pods of an average or even diminutive size, and the tree in producing the latter is not using its forces to form so much material which brings no monetary return.


1
15" by 10"
122 gr.
Seeds 32
unop. pod 439 gr.
2
28" by 14"
119 gr.
Seeds 44
unop. pod 1665 gr.
3
12½" by 9¼"
111 gr.
Seeds 37
unop. pod 357 gr.
4
14½" by 9¾"
110·5 gr.
Seeds 32
unop. pod 392 gr.
5
15½" by 9¼"
110 gr.
Seeds 31
unop. pod 397·5 gr.
6
14½" by 10½"
98·5 gr.
Seeds 30
unop. pod 410·5 gr.
7
26" by 13"
98 gr.
Seeds 36
unop. pod 1462 gr.
8
14½" by 11¼"
95·0 gr.
Seeds 31
unop. pod 447·5 gr.
9
16" by 11"
95·0 gr.
Seeds 27
unop. pod 526 gr.
10
14" by 10"
78·0 gr.
Seeds 37
unop. pod 394·5 gr.





The figures in the unshaded part of the diagrams are the two perimeters, *i.e.*, measurement round lengthways and circumference at the thickest part, in inches. The figures under the shaded part are the weights in grammes of the seeds in the pod. The total weight of unopened pod and number of seeds are given below each figure.

TEA SALES IN COLOMBO LAST YEAR.

The local "Times" has been compiling the estate and total averages for last year's Colombo Sales. On the whole, the result is encouraging for supporters of the Colombo Sales, and we trust the day is not far distant when through the abolition of the absurdly anomalous import duty (accompanied by expert Customs inspection) the business and importance of the local Sales may increase, leading to the arrival of more buyers to what ought to be one of the greatest tea markets in the world. Meantime here are the results:—

ANNUAL TOTAL AND AVERAGE.

Year	lbs.	cts.	Year	lbs.	cts.
1891	9,578,611	41	1896	25,402,624	41
1892	11,578,869	41	1897	26,512,099	36½
1893	14,365,017	43	1898	28,847,212	35
1894	15,723,020	43	1899	32,472,010	38¼
1895	19,668,116	47	1900	38,442,926	34½

HIGHEST ESTATE AVERAGES FOR 1900:

Estate	lbs.	cts.
High Forest	278,000	59
Monkswood	173,600	55
Palmerston	92,000	55
Devonford	67,000	54
Sutton	43,500	53
Glassaugh	203,000	53
St. John's	136,500	53
Naseby	108,000	52
Mocha	177,000	52
Warleigh	21,500	52
Summer Hill	188,800	51
New Galway	17,000	50
Agra Elbedde	97,000	49
Tymawr	170,000	48
Agra Ouvah	373,000	48
Errollwood	86,000	46
Gonapatiya	160,600	47
Dunbar	95,400	47
Avoca	62,000	47
Ireby	99,000	47
Stafford	35,000	47
Iona	104,000	47
Strathspey	53,000	46
Ovoca	62,000	45
Glasgow	380,000	45
Kenmare	23,000	45
Hatton	91,800	45
Middleton	102,000	45
Cleveland	62,000	45
Roeberry	212,000	45
Fetteresso	17,000	44
Mt. Everest	113,800	44
Wallaha	73,000	44
Bunyan	10,000	44
Eton	24,000	44
Lynsted	50,400	44
Haputalewelle	12,000	43
Dambagastalawa	84,000	43
Adisham	45,000	43
Cullen	37,000	43
Stamford Hill	105,000	43
Forest Creek	317,000	43
Warwick	51,500	43
Carfax	66,200	43
Marigold	138,000	43
Seenagolla	65,000	43
Clarendon	32,000	43
Annandale	107,000	43
Fairlawn	79,000	42
Harrow	121,000	42
Nahavilla	136,000	42
New Valley	128,000	42
Gomalia	30,100	42
Ardlaw & Wishford	174,000	42
Bittacy	65,000	42
Ben Nevis	53,000	42
Queensland	130,000	42
Rahatungoda	101 500	42
Osborne	56,500	42
Drayton	89,000	41
Killarney	108,000	41
Glentilt	23,000	41
Birnam	9,000	41
Choisy	103,000	41
Frogmore	24,300	41
Harrington	116,300	41
Lindupatna	58,000	41
Blinkbonnie	86,000	41
Columbia	85 500	40
Troup	15,000	40
Inverness	90,000	40
Oakwell	17,000	40
Passara Group	141,000	40
St. Pauls'	186,000	40
Fairfield	66,000	40
Doonhinde	47,000	40
Anchor Mark	34,000	40
Tonacombe	280,000	40
Mansfield	109,000	40
Templestowe	185,000	40
Pendle	38,000	40
Tyspane	40,000	40
Rothes	25,000	39
Kirrekelle	37,500	39
Passara	40,000	39
Marlborough	80,000	39
Callander	71,800	39
Non Pariel	22,600	39
Castlereagh	213,000	39
Ruanwella	123,700	39
Maskeliya	141,000	39
Gampaha	158,000	39
Dunkeld	212,000	39
Mandara Newara	59,700	39
Mossend	25,000	39
Lameliere	112,000	39
Rowley	66,900	38
Erlsmere	138 000	38
Hornsey	156,500	38
Rookwood	248,000	38
Oonoogaloya	114,000	38
Munukattia	85,600	38
Aberdeen	137,000	38
Maha Uva	280,000	38
Mt. Vernon	62,000	38
Mousakella	95,000	38
BandaraEliya	276,000	38
Lyegrove	28,000	38
Gangawatte	173,000	37
Stockholm	19,000	37
Bargany	50,700	37
Beverley	16,200	37
Corfu	58,000	37
Ohiya	55,000	37
Brownlow	306,000	37
Yapame	37,000	37
Walton	47,500	37
Kelaneiya and Braemar	112,000	37
Deaculla	138,500	37
Kolapatna	34,000	37
Whyddon	71,000	37
Oakham	46,000	37
Parsloes	100,600	37
Galapitakanda	97,000	37
Penrhos	202,000	37
St. Heliers	95,600	37
Ottery	159,000	36
Gonavy	155,000	36
Deyanilla	15,000	36
Gingran Oya	39,500	36
Nillomally	165,800	36
Luckyland	18,000	36
Hopewell	69,000	36
Loughton	55,000	36
Kirklees	140,000	36
Ingrogalla	77,000	36
Battawatte	169,000	36
Grange Garden	79,000	36
Mahanilu	139,000	36
Galella	100,000	36
Deniyaya	141,000	36
Great Valley	231,000	36
Dickapittia	115,000	35
Doragalla	210,500	35
Elchico	60,000	35
Agars Land	29,000	35
Glengariffe	135,000	35
Maldeniya	89,000	35
Ferndale	115,000	35
Nyanza	134,000	35
Coreen	70,000	35
Battalgalla	83,500	35
Coslanda	67,000	35
Theydon Bois	110,000	35
Dammeria	254,000	35
Rambodde	74,600	35
Lonach	159,300	35
Mora Ella	101,000	35
Bidbury	20,500	35
Patisgama	97,000	35
Galloola	135,000	35
Perth	120,000	35
Little Valley	89,000	34
Orpington	15,500	34
Cotswold	46,000	34
Attampettia	15,000	34
Dalhousie	70,000	34
Maragalla	39,300	34
Agra Oya	108,000	34
Telbedde	38,000	34
Ouvahkellie	14.000	34
Hayes	267,500	34
Pallegodda	308,000	34
Cooroondoowatte	90,000	34
Old Maddegamme	102,000	34
Arapolakande	267,000	34
Clyde	187,000	34
Woodstock	12,200	34
Kandaloya	156,500	34
Kellebokke	43,000	34
Wadhurst	16,000	34
Oonankande	26,500	34
Oonanagalla	27,000	34
Weemalla	20 000	34
Yakka	26,000	34
Jak Tree Hill	37,700	34
Gwernet	23,000	34
Macaldenia	77,000	34
Rickarton	20,500	34
Digdola	76,000	33
Meddakande	61,300	33
Tembiligalla	115,000	33
Yarrow	173,000	33
Suduganga	57,000	33
Theberton	41,700	33
Ravana	54,000	33
Ranasinghapatna	174,000	33
Bollagalla	62,000	33
Palawatte	11,000	33
Waitalawa	103,000	33
Dea Ella	73,000	33
Kotagaloya	17,000	33
Yahalatenne	22,000	33
St. Johns Wood	10,000	33
Villehena	33,500	33
Stisted	44,000	33
Kincora	121,000	33
Hopton	155,000	33
Glenden	131,000	33
Malvern	91,000	33
Massena	63,500	33
Cairn Hill	29,500	33
Thedden	79,500	33
Tientsin	9,000	32
Koslande	72,000	32
Aberfoyle	48,000	32
Dryburgh	65 000	32
Haugran Oya	152,000	32
Glenalmond	21,000	32
Monte Christo	46.000	32
Matale	88,000	32
Farnham	118,000	32
Tavalamtenne	35,000	32
New Rasagalla	60,900	32
Morankande	70,000	32
Sapitiyagoda	67,700	32
Meddegodde	79,400	32
St. Catherine	30,000	32
Pine Hill	190,500	32
Richmond Hill	24,500	32
Gampai	50,000	32
Wahagapitiya	8,000	32
Vogan	446,000	32
Ella Oya	118,600	32
Chesterford	334,000	32
Glencorse	183,000	32
Anningkanda	77.500	32
Mapitigama	63,000	32
Galphele	93,000	32
Evalgolla	46,000	32
Panilkande	113,500	32
St. Martin	24,000	32
Raven Oya	12,800	32
Murraythwaite	88,000	32
Morahela	151,500	32
Rendura	190,000	32
Hiralouvah	361,000	31
Choughleigh	33,500	31
Pindeniya	37,600	31
Kelani	212,000	31
Torwood	170,000	31
Weyungawatte	193.000	31
Putupaula	191,000	31
Irex	106,000	31

	lbs.	cst.
Ganapalla	264,000	31
Pitadeniya	22,000	31
Harrisland	28,500	31
Bloomfield	63,600	31
Gansarapolla	22,500	31
Waratenne	63,700	31
Ardnthie	9,000	31
Dalukoya	68,000	31
Amblakande	56,000	31
Claremont	33,600	31
Kurunegalle Estate Co.	45,500	31
Ravenscraig	82,800	31
Galpottagama	17,000	31
Hentleys	25,000	31
Galkadua	59,500	31
Talgaswella	197,600	31
Bevey	12,000	31
Neboda	191,600	31
Raven Oya	15,800	31
Walpita	92,000	31
Yataderia	58,000	31
Raygam	250,000	31
Siriniwasa	106,000	31
Mel Villa	13,600	31
Eadella	47,000	31
St Edwards	16,300	31
Elston	51,700	31
Kurnwathai	21,300	31
Bickley	68,000	31
Shrubs Hill	212,000	31
Freds Ruhe	134,000	31
Gallawatte	136,000	31
Holmsdale	35,000	30
Yellangowry	22,700	30
Sindumallay	49,000	30
Mahapahagalla	18,000	30
Ewhurst	18,700	30
Kitulgalle	65,000	30
Erracht	222,000	30
Amblangoda	60,800	30
K. P. W.	211,000	30
Halwatura	198,000	30
Kakiriskande	16,700	30
Knavesmire	326,000	30
Wewawatte	20,600	30
Kotuagedere	101,000	30
Lower Dikoya	53,000	30
Maddagedera	103,000	30
Horagoda	44,000	30
Kosgama	34 000	30
Wewatenne	40,000	30
Forest Hill	52,000	30
KeenagahaElla	63,000	30
Auburn	40,900	30
Hapugastenne	84,700	30
Tempo	80,000	30
Weoya	191,000	30
Yaha Ella	24,000	30
Syston	44,000	30
Woodthorpe	45,800	30
Neuchatel	208,500	30
Mahatenne	88·400	30
Halgolla	105,000	30
Ratwatte	73,000	30
Handrokande	11 000	30
Roseneath	72,000	30
Harangalla	211,000	30
Doonevale	8,500	30
Dikmukalana	62,000	29
Ladysmith	176,000	29
Havilland	51,000	29
Narangoda	113,000	29
Carney	53,000	29
Warakamure	182,000	29
Mary Hill	63,000	29
Sirikandura	70,500	29
Kalupahana	18,000	29
Nugagalla	69,000	29
Torrington	61,500	29

	lbs.	cts.
Nillicollay-watte	41,500	29
Polgahakanda	104,000	29
Silverton	55,000	29
Lyndhurst	64,500	29
Bodawa	13,600	29
Ninfield	58,500	29
Holton	60,000	29
Beaumont	106,000	29
Ascot	21,000	29
Doranakande	169,000	29
Yellateune	10,000	29
Clunes	200,000	29
Weriatenne	21,000	29
Nuawella	51,500	29
Carendon	34,000	29
Monrovia	119,000	29
Hatdowa	90,000	29
Kahatagalla	8 000	29
Myraganga	266,000	29
Gangwarily	69,000	29
Wendura	31,500	29
Mousa Eliya	30,000	29
Caledonia	11,500	29
Eladuwa	37,000	29
Moragalla	20,000	29
Kanangama	97,000	29
Sada Mulla	43,000	29
Ingeriya	103,000	29
Honiton	60 900	29
Ferriby	116,000	29
Eilandhu	25,000	29
Labugama	66,000	29
Depedene	112,000	29
Graceland	23,700	29
Mahayaya	27,400	29
Pannawatte	17,000	29
Waragalande	22,000	29
Mahalla	36,600	29
Oakfield	25,000	29
Udapolla	27,000	29
Ettie	16,000	28
Henhurst	46,000	28
Mary Land	15,000	28
Manickwate	52,000	28
Kurulugalla	67,000	28
Hanagama	113,000	28
Beausijour	36,000	28
Salawe	75,000	28
Paradise	43,600	28
Welgampola	24,000	28
Bellongalla	106,000	28
Eila	227,000	28
Geragama	233,000	28
Ambragalla	225,000	28
Galkanda	47,000	28
Bokutua	8,500	28
Yatiyana	30,000	28
Polatagama	405,000	28
Primrose Hill	33,000	28
Palm Garden	22,500	28
Pansalatenne	90,000	28
Dooroomadelle	51,000	28
Gleuesk	41,000	28
Bogahagoda-watte	42,000	28
Wilpita	39,000	28
Horagaskelle	8,600	28
Charlie Hill	35,000	28
Selvawatee	23,000	28
Hapugas-		28
mulle	49,000	28
Killin	59,300	28
Kadienlena	26,000	28
New Angamana	28,000	28
Puspone	60,600	28
Woodend	222,400	28
Halbarawe	22,000	27
Lunugalla	48,000	27
Hanwela	27,500	27

	lbs.	cts.
Poilakande	238,000	27
Yspa	21,000	27
Neetiagoda	8,000	27
Avisawella	212,000	27
Oaklands	64,000	27
Allagalla	16,800	27
Mawiliganga-watte	187,000	
St. Leonards		27
on Sea	52,900	27
T. Vila	50,800	27
Natuwakelle	38,000	27
Yogama	18,000	27
Vincit	63,500	27
Damblagolla	36,600	27
Elkaduwa	28,500	27
Riseland	15,000	27
Ketadola	31,000	27
Mousakanda	41,500	27
Patulpana	17,000	27
Citrus	95,100	27
Labuduwa	11,000	27
Ettapolla	15,000	27
Mt. Clare	57,000	27
Hurstpierpoint	11,000	26
Bope	12,000	26
Uragalla	10,000	26
Mount Temple	36,500	26
Mount Pleasant	5,500	26
Nakiadeniya	81,500	26
Kurulana	18,000	26

	lbs.	cts.
California	25,300	26
Ambalawa	57,700	26
Halloowella	9,800	26
Danawakande	9,400	26
Bloom Park	19,000	26
Udabage	37,000	26
Kosgahahena	31,300	25
Kosgalla	38,300	25
Maligatenne	62,000	25
Paragabakande	23,100	25
Tiddydale	36,400	25
Orange Field	26,800	25
Sangaly Toppe	8,000	25
Mossville	7,500	25
Dumbarton	16,600	25
Uda	30,000	24
Koladeniya	31,000	24
Pituville	10,000	24
Bowhill	11,000	24
Florida	25,000	24
Illukettia	20,000	24
Ossington	32,000	24
Attiville	67,000	23
Ahamad	27,000	23
Kerenvilla	18 000	23
Akkara Totum	9,700	23
Dartry	16,800	23
Trewardene	10,800	22
Kananke	14,000	22
Mahaousa	38,000	21
Dehiowita	26,000	20

THE AGRICULTURAL CHEMIST TO THE GOVERNMENT OF MYSORE.

The following are Extracts from the Report of the Agricultural Chemist to the Government of Mysore for the year 1899-1900:—

LABORATORY.

As a Chemical Laboratory is a matter of prime importance to an Agricultural Chemist, several plans for such a laboratory were prepared by the Agricultural Chemists and State Geologist. The plan selected by the Government provides for the chemical work of the Geological Department being done in the same building as that containing the laboratories and office of the Department of Agriculture. In it the present "Geological Laboratory" is included. The fixtures are being made similar to those of the laboratory of the Central Experimental Farm, Ottawa, Canada, and will, it is hoped, prove as eminently satisfactory as those from which they were copied. Before building the necessary additions, the Department of Public Works are kindly undertaking to make all the changes required in the present building to adapt it to the new requirements. This wil give the Chemist some space in which he can begin analytical work before the entire building is completed—a kindness for which he is very grateful to Goverument and their Department of Public Works. The chemical apparatus has beeu selected from various catalogues so as to get the best value. As always, a portion of it had to be made to order to meet special requirements or to embody improvements which appeared desirable. A large portion of it has arrived.

SAMPLES.

Chemical.—Twenty-five samples taken in connection with the study of various problems of general interest to coffee planters are awaiting analysis. In addition to these, ten miscellaneous samples have been received. To dispose of this work only will require at least three or four months, and numerous other samples are waiting to be sent as soon as there is some prospect of their beiug taken in hand.

Mycological.—Eleven samples of plants affected with fungoid diseases were received and disposed of as circumstances permitted. All that could be done was

to recommend the application of Bordeaux mixture where practicable.

Entomological.—Three parcels of larvæ of injurious insects were received during the year. For leaf-eating insects not protected by a covering, an application of Paris green cannot be too strongly recommended, provided care is taken not to poison domestic animals or men. Paris green is an arsenite of copper which has been largely used as a pigment; and is now one of the most popular insecticides. It may be applied either as a spray when suspended in water (about one ounce to ten gallons of water) or dusted on the plants in the dry condition when mixed with 100 times its weight of perfectly dry fine flour or better still "land plaster" (Gypsum) if it can be got. Since the close of the year, several samples of injurious insects and plant diseases have been received. These made it necessary to visit several fields, and have led to a practical demonstration in applying Bordeaux mixture. Paris green could not, unfortunately, be obtained at the time. In the near future it may be necessary to write a bulletin on the subject. When sending insects it is absolutely necessary to provide them with some of the leaves of the plants on which they are feeding.

Much more important than the correspondence, in the way of giving information, were the interviews in the office; and more important still, the talks and lectures on the estates, the villages, or the fields and gardens visited when on tour. But of these no record is kept. In response to an invitation from the United Planters' Association a general outline of plot experiments and some of the fundamental principles of manuring were discussed at their meeting held in Bangalore.

TOURS.

The three principal tours undertaken during the year were:—

1. To Bidadi and Closepet,
2. To Koppa.
3. To Shimoga District and Mangalore.

A tour to Koppa was undertaken in July to become personally acquainted with the effect of the very heavy rains which usually occur during that season of the year in the Malnad Districts. But owing to the practical failure of the monsoon, not even a moderately heavy shower of rain occurred during the stay of nearly two weeks. The time was occupied in noting what could be seen of the diseases of coffee and arecanut. These diseases are of a fungoid nature. The condition of the mcisture which largely influences the growth of the specific fungus, especially Koleroga, is doubtlessly one of the most important factors in the spread of the diseases mentioned. But as the vitality of the trees has doubtlessly something to do with resisting the attack of the disease, the task of finding a remedy is not absolutely hopeless.

The coffee works at Mangalore were visited to see the last step of the preparation of coffee for the European market.—*Planting Opinion.*

RICE CULTIVATION.

(*From a Correspondent.*)

Some weeks ago you published a letter from your South Mysore correspondent which contained, amongst other interesting details of planting news from that locality, an allusion to the fact that some Mysore planters are embarking in rice cultivation, in conjunction with that of their coffee estates. An agricultural undertaking of this description requires practical experience in order to insure its being profitably conducted, and the following particulars may therefore prove useful to those who have not essayed the cultivation of paddy, or to such as have still something to learn on that subject, the more so, as with the acute crisis through which the coffee industry is now passing, every estate proprietor will hail with satisfaction any facilities for augmenting the revenue accruing from his holdings. There are probably many blocks held by planters which either include lands within their boundaries suited to the profitable growth of paddy, or which, from their close proximity to the latter, can be conveniently taken up from Government, or from private landlords, while the advantages of utilising such areas for raising an article of consumption available for the labour employed, both in the growth of the cereal itself and on that engaged on their estates, are so obvious, that it seems strange rice has not hitherto been more largely tried by European planters.

There are two methods by which paddy can be successfully grown in the planting districts, namely, by indigenous, *i.e.*, local labour and by imported coolies, the former being preferable, as it is continuously available, and better trained to this special work. The scale of remuneration ruling for local labour employed on wet lands usually consists of a daily payment in the form of doles of grain, a man receiving for a full day's work approximately 4 lbs. of paddy, and a woman 3 lbs., while one anna in cash is disbursed weekly to such of the former as may have laboured for not less than five days in each week, and twice a year all hands are presented with a couple of coarse white cloths, on the anniversary of their two principal festivals, in April and August. Imported labour is, however, paid in specie at the rate of 4 annas per man and 2½ annas per woman daily. It may be assumed that, on the average, the value of paddy in the planting districts does not exceed R2 per maund, of 82 lbs, and upon such hypothesis the rate of remuneration earned by imported labour is rather more than twice as high as that paid to local coolies. When, therefore, framing an estimate of the necessary outlay incidental to a paddy cultivation, it will be fairest to strike an average, and charge the account with the labour at an all-round rate of 3 annas per diem. A forty-acre stretch of wet land suffices to grow seedlings raised from 40 maunds of carefully winnowed seed grain, and a herd of 40 ploughing buffaloes are essential to work the block successfully. In addition to the initial outlay connected with the first season's cultivation, the cost of bunding the land may have to be met. Good ploughing buffaloes are procurable at about R15 apiece, so that the outlay on the latter, and on the seed grain, would amount to R680. If, however, the land taken up possesses the requisite bunds, from the last ryot's occupancy, no block disbursements on earth work is required, and as this is the rule on tracts thoroughly suited for growing rice, it seems scarcely necessary to allow for special expenditure under this head. The accruing manure from a herd of 40 buffaloes should suffice to liberally fertilise every portion of the land at least once in two years, or to manure half the extent in each season, while the animals are utilised (1) for ploughing and harrowing, and (2) for threshing, *i.e.*, treading out the grain.

Irrespective of the block expenditure on seed grain and on buffaloes, as well as on a few ploughs and tools, a sum of about R750 would be required to cover the whole of the first season's expenses, up to hulling the grain, while in the following year it would be unnecessary to incur any outlay under the three former headings. Paddy, on an average, takes about four months to mature, and on some lands, where special facilities for perennial irrigation are available, two harvests can be raised annually; but as a rule on hill tracts a single crop of grain is grown in each season. There are a couple of methods of cultivating paddy profitably (*a*) from seedlings, and (*b*) by sowing the seed broadcast; but the yield, where the work is well done, is far more satisfactory from the former than the latter plan, and no weeding is required for seedling planted paddy lands, whereas on areas treated the other way weeds and grass cause some loss and trouble. As regards the

yields from paddy grown from seedling, or under the broadcast system, a crop of from 15 to 30 fold is obtained on liberally cultivated lands of the former, but rarely in excess of 15-fold from the latter. The following details of expenditure connected with cultivating a compact block of 40 acres of wet land are based on actual experience of such work, but the figures quoted as regards yield are slightly below what it has been found that fairly good land will bear in favourable and in bad seasons. Where the area treated is smaller, the outlay under all heads except that of supervision is necessarily minimised :—

Block Outlay.	R.	
To cost of 40 ploughing buffaloes ...	600	
To cost of purchase of 40 maunds of seeds grain	80	
To cost of 12 ploughs and tools ...	30	
		710

Revenue Outlay	R.	
To herding 40 buffaloes ...	90	
To ploughing 40 acres of land each square, at least 6 times, before planting, as also cost of repairing bunds ..	270	
Application of manure ...	20	
Sowing seed in seed beds ...	40	
Reaping the grain	40	
Threshing and winnowing ..	40	
Overseer's salary	120	
Rent of land	100	720
		R1,430
Value of crop of 600 maunds of paddy, or 15 fold, at R2	1,200	
Value of straw yielded ..	250	
	R1,450	20
Balance profit ...		R1,450

It will be observed that the first season's operations show merely a nominal profit, because Block expenditure, amounting to R710, is added to current Revenue account ; but the former would not be required in the following year, and hence, the sum so shown would be approximately the net profit on the second season's operations, if the grain is reserved and used as paddy, but a far more lucrative result can be obtained by allotting a moiety of the paddy crop in the husk for the second season's contingencies, and by disposing of the other half as raw rice. The subjoined figures indicate how this scheme works out :—

Cost of hulling 300 maunds of paddy at 3 as per maund ..	R56-4-0	
Value of 7,200 measures of clean rice, accruing from 300 maunds paddy, refined, sold at the rate of 9 measures per rupee ..		R800
Net profit on hulling	..R744-12-0	
	R800-0-0	

The foregoing calculations, which have been framed upon data actually acquired from experience, demonstrate what a highly profitable undertaking rice cultivation can be made when conducted on approved principles, as the value of the produce, that is of 300 maunds paddy, and 7,200 measures clean rice, shows a large margin of profit over working expenditure, irrespective of the value of the straw itself. —*Madras Mail.*

THE DATE PALM (PHŒNIX DACTYLIFERA).

Undoubtedly, next to the cocoanut palm, the date palm is of the most value to man.

It is a beautiful and majestic tree, the stem forming a cylindrical column rising to a height of 50 or 60 feet. From the summit of the trunk it throws out a crown of leaves which are equally graceful in their formation and in their arrangement. We, in Queensland, should ultilise this beautiful palm not only for garden ornamentation, but for its fruits. One reason that this palm has not been more largely planted is that it is diœcious, having the male flowers on one plant and the female or fruiting ones on another. One male plant will fertilise a number of female plants, but it does not appear that a male plant is absolutely necessary to induce a female plant to bear dates. It is probable that the seeds of the dates will, in such a case, not be fertile, but the tendency of the age is to produce fruit without seed. There are at the present time two date palms growing in Brisbane laden with fruit—one in the Botanic Gardens (an illustration of which is here given), and the other in the garden of the late Dr. J. Bancroft, in Ann street. The seeds of these palms may not be fertile, but that is of little moment—the fact remains that the date palm (*Phœnix dactylifera*) will fruit in Queensland, and that freely. This palm should be largely planted—in suitable districts—around water boxes, where they would in a few years form oases in tracts swept by hot winds, and in time they would become a real boon. They might also be planted on the islands along the coast. Plants can be raised from the seed of imported dates, but it is some years before such plants fruit. Offshoots taken from fruiting plants are best for planting, as these will fruit in about five years. A few years ago a number of suckers were imported and distributed by the Acclimatisation Society. Some of these should now be fruiting, and from them offshoots could be obtained.

There are several varieties of *Phœnix*, all of which are called date palms, but which are useless, except for decorative purposes, so care should be taken to obtain *Phœnix dactylifera*, all other kinds being useless for fruit-bearing.

In South Australia the planting of date palms has proved very successful. At Lake Harry (in the far north) the seedings are now from 3 to 5 feet high, and many plants of either sex have flowered. The Algerian palms have made great progress, and some are quite 10 feet high. There have also developed numerous suckers, such as Mr. Pink describes as best for transplanting. Good fruit has also been produced by several of the trees. The variety planted is the "Deglet Nour." At Hergott Springs the fruit has ripened for eight seasons. Here, there are 277 thriving palms. At Lake Harry there are 2,745, and at Oodnadatta 36. Our illustrations, for which we are indebted to the Conservator ef Forests of South Australia, give a good idea of the plantation Hergott. —*Queensland Agricultural Journal.*

A NEW ASSAM TIMBER TREE.

By D. Prain, I.M.S., F.L.S., &c.

In October, 1886, Mr. Barker, of the Forest Deparment, called attention to the existence of a tree which he was unable to identify, occurring at the foot of the hills in the North Lakhimpur district and known to the Assamese as the "Sia Nahor." He had submitted specimens for identification to the Forest School at Dehra Dun, but having received no definite reply he sent a flowering example to the Calcutta Herbarium. Mr. Barker's specimen was not a very good one ; it sufficed, however, to show that while "Sia Nahor" belongs to the same natural order as the "Nahor" proper (*Guttiferæ*), it is not like "Nahor," a *Mesua* but a *Kayea*. The specimen sent was, as a matter of fact, tentatively referred to *Kayea floribunda*, a not uncommon tree in the lower hill forests of Sikkim, Bhootan, Khasia! Cachar and Lushai, known in Cachar and Sylhet as "Kurun" (*Wallich*) or "Kurul" (*G. Mann*). The flowers of Mr. Barker's specimen were, however, so much smaller than those of *Kayea floribunda*, that it was clear from the first that "Sia Nahor" was at least a distinct variety of "Kurul."

Nothing further was heard at Calcutta of Sia Nahor for thirteen years when, in December, 1899, Mr. Young, Deputy Conservator, sent a set of specimens, this time in fruit, for identification. Mr. Young writes as follows:—"The tree is to be found on the north bank only, and is most plentiful immediately under the hills in the North Lakhimpur sub-division. This fact probably accounts for its absence from Peal's list of Assam Timber trees, as I understand his collection was confined to the south bank of the Brahmaputra.

"The tree is large, with a straight bole 60 feet and more to the first branches, bark grey, wood close-grained, hard and very heavy. It is said to be very good for structural purposes, but decays rapidly in contact with the soil."

An examination of Mr. Young's fruiting specimens made it clear that the Sia Nahor was not *Kayea floribunda*, but before preparing a formal description, fuller material was desirable. Mr. Young was accordingly asked to send flowering specimens to correspond with the fruiting ones already sent. With this request, Mr. Young very courteously complied in June, 1900. These plainly showed that in "Sia Nahor" we have to deal with a hitherto undescribed species of *Kayea*. To make this absolutely certain, the material now available was submitted to Sir George King, who has kindly compared the specimens with those in the collection at Kew and, in confirming the view that the species has not before been described, has kindly undertaken the joint responsibility as to its name. A formal description of the tree is given below.

Kayea assamica, *King and Prain.*—A tall handsome glabrous tree, bark grey, wood hard, close-grained; young branches pale, slender, cylindric. *Leaves* opposite, firmly coriaceous, entire, ovate lanceolate, base cuneate, apex shortly caudate-acuminate, nerves numerous, equal, slender, one-eighth of an inch apart, not prominent on either surface, upper surface somewhat shining, lower dull; length, 3·5—4·5 in.; width, 1·35—1·75 in.; petiole slender ·4 in. long. *Flowers*, in slender, terminal and axillary panicles, 3—6 in. long, branches of panicle short, slender glabrous, pedicels in flower very slender, ·2 in. long, in fruit elongated and thickened, bracts and bracteoles at base of branchlets, and pedicels 2 opposite small caducous. *Sepals* 4, imbricate, outer pair orbicular ·15 in. long, much enlarged in fruit, inner wide spathulate, apex rounded. *Petals* 4, shorter than sepals, suborbicular, ·1 in. long, thin, white. *Stamens* many, filaments free, capillary, longer than sepals; anthers globose. *Fruit* globose; covered by the thick accrescent calyx, tipped by the remains of the style, ·85 in. across. *Seed* solitary.

Assam; North Lakhimpur, near the foot of the hills, common, *Barker! Young!*

The species is most nearly allied to *Kayea floribunda* which, however, differs markedly in its much longer leaves, narrower for their width, with fewer more arching nerves which are much more prominent beneath; in its more copious racemes with larger flowers and in its much larger fruit which is 1·5—1·75 in. across.—*Indian Forester.*

PLANTING NOTES.

Sisal Hemp.—Some thousands of Sisal hemp plants have been planted round the island of St. Helena, Queensland's penal establishment. The suckers were put in about twelve months ago, and they now average about 5 feet in height, each plant having from 40 to 50 leaves from 4 to 5 feet in length. If any proof were wanted of the adaptability of our climate to this valuable plant, it is plainly furnished here. If the authorities of the island are provided with facilities to clean the leaves and produce the fibre during the ensuing twelve months, there can no longer remain any doubt as to whether the crop would pay or not, especially if accurate records were kept of the actual amount of labour and time expended from the cutting of the leaves to the baling of the cleaned fibre.—*Queensland Agricultural Journal.*

An Inch of Rain.—What does an inch of rain mean? Few persons have a definite idea. An acre, if calculated out, will prove to be 6,272,640 square inches. An inch deep of water on this acre will be as many cubic inches of water, which, at 231 to the gallon, is equal to 27,154 gallons. This immense quantity of water will weigh 228,190 lb. or 114 tons. One hundredth of an inch (·01) alone is equal to over one ton of water to the acre. In forty-eight hours, during the month of January, 15½ inches of rain fell at Geraldton. This was equal to 420,837 gallons per acre or 1,767 tons, or about one-seventh of the total quantity required to irrigate a crop of sugar-cane during the growing season.—*Ibid.*

Caprification of Figs.—The caprification or cross-pollenisation of figs is described in a recent number of the *Californian Fruitgrower*. The work in Smyrna is performed by women and children, who gather the profichi and suspend them in the branches of the Smyrna tree. In the Meander orchards it is customary to string the hard profichi on the ends of rushes, which are pushed horizontally through the sides of the fig; if the profichi are plentiful, two are strung on each end of the rush, which is then thrown up into the Smyrna tree and caught among the branches. The fig wasp, on emerging from the profichi, enters the figs nearest to hand, not discerning any external difference between the young Smyrna figs and the young mammoni, which it would enter if still in the caprifig tree. But, once inside, the fig wasp discovers that something is wrong, for, instead of finding short-styled male flowers in which it could lay its eggs, there are only female flowers with long styles, which are entirely unfitted to receive the eggs; the insect is unable to escape, and, in darting about in vain efforts to find some male flowers, the pollen with which it was so freely dusted in emerging from the profichi is rubbed into the receptive stigmas of the female flowers. The little wasp finally dies in the fig without having been able to provide for the production of its kind, and, on cutting open a Smyrna fig shortly after caprification, one can usually find the dead insect.—*Ibid.*

Conifers as Rain Gauges.—According to a recent number of the *Revue Horticole*, M. Felix Sahut has lately communicated to the Congrès des Sociétés Savantes observations respecting certain plants that act as registering rain gauges:—"Mention has already been made of the influence of certain more or less severe droughts in the French Mediterranean upon *Pinus Laricio* of Corsica, and Cephalonian Fir. The lengthening of the branches of these two species is always proportionate to the quantity of rain falling during those months of the year when it is most profitable to them. Co-efficients have been established indicating what the degree is for each month of the year. These co-efficients enable the relationship that exists between the amount of rain fallen and the greater or less intensity of the vegetation which it has encouraged to be determined. It is shown that, under these conditions, it is possible to judge approximately the quantity of rain which has fallen by measuring exactly the length of the leader, or of the branch produced yearly on these species of pine, and, if the estimate is not absolutely proportionate to the quantity of rain registered by the rain-gauge, it closely approaches to it; and a still closer estimation may be made by taking into account the relative value of the results produced by rain in the several months of the year. It is, therefore, possible, to a certain extent, to use plants specially selected for this purpose as actual registering rain-gauges."—*Ibid.*

SOIL BACTERIA.

(From *Agricultural Gazette* of New South Wales.)

R. Helms.

The discovery of the important part played by certain bacteria within the soil in converting nitrogenous substances into nitric acid, in which form plants assimilate one of their most important foodstuffs, has created a clearer conception of the processes by which such chemical changes are brought about. This, together with the discovery that certain plants by means of similar minute organisms in their roots can utilise the nitrogen of the atmosphere, has opened out new vistas to scientific agriculture.

Besides these oxidising organisms a number of others occur extensively, which act in the reverse manner by reducing nitric acid to ammonia, or even to nitrogen, and thereby play, on the whole, an even more important part in the economy of nature, although in many instances their action is the reverse of benefical to plant life. These are known as reducing or denitrifying organisms in contradistinction to the first-mentioned, which have been named, nitrifying bacteria.

Anything we can do to increase the dovelopment of the nitrifying bacteria, or to design methods for checking the too rapid multiplication of the reducing organisms, will, at the same time, be the means of increasing the fertility of the soil, improving those soils that are poor, and maintaining the productiveness of more fertile ones, since, of all the factors on which the fruitfulness of land depends, the power of nitrification is undoubtedly the most important.

Investigations with this aim in view, carried on during late years in the greater number of countries where agriculture is pursued according to advanced principles and with modern appliances, have led to promising results, and these researches, together with the better understanding of the value of manures, are beginning to produce a revolution in the theory and practice of agronomy.

Since the functions of these organisms are considerably affected by their surroundings, and they behave differently in different soils and climates these differences may prove to be very pronounced in Australia where both soil and climate are so extremely variable and peculiar. It is therefore not possible to accept as conclusive the results obtained by investigators in other countries, and it becomes necessary to study their behaviour under local conditions.

Before further discussing the different groups of soil bacteria and dwelling upon their characteristics, it is desirable to sketch the history of their discovery in an epitomised form, and to present the results hitherto obtaied by different investigators.

Historical.

As far back as 1862, Pasteur surmised that nitrification in soil was due to micro-organisms. Up to his epoch-making investigations, fermentations were considered to be the result of purely chemical reaction, and it was but natural that, after proving the important part played by the yeast organisms, he should go so far as to consider other phenomena involving complex chemical changes as being connected with similar microbes.

Schloessing and Muntz proved in 1878 that the action of minute organisms caused nitrification, or the transformation of ammonium salts into nitrates by oxidation. This fact was confirmed by Warrington in the same year. A definite knowledge of the specific organisms producing the alteration of nitrous compounds were, however, not obtained.

Heræus was the first who, in 1886, applied the modern methods of bacteriological research to this subject. He claims to have obtained positive results. By means of elaborate investigations on a large number of bacteria obtained from soil, water, and air he managed to produce pure cultures. Among them he credited four distinct bacilli with nitrifying power.

Frank soon after made lengthy investigations on bacteria insolated from several kinds of soil, and obtained entirely negative results. In consequence he disputed the vital process in connection with nitrification.

This conclusion was rebutted by Plath and Baumann in 1887.

Celli and Marino Zucco in the meantime had experimented with five micrococci isolated from the highly nitrated water of Rome, but did not succeed in proving that any of these were the specially-qualified nitrifying organisms.

Warrington examined, in 1888, a large number of bacteria obtained from soil for their nitrifying power without arriving at the desired result; but when, instead of his pure cultures, he took ordinary soil for seeding his food media with, he always succeeded in inducing nitrification. These researches led him to the conclusion that the specific organisms had yet to be found.

Further, Percy Frankland and Grace Frankland have paid attention to this important question. Although they experimented with twelve different organisms isolated from soil, the result was in every case a negative one; but, as with Warrington, when using a little of the soil from which the organisms had been obtained, nitrification was readily excited in the culture fluids.

As these many experiments of such able bacteriologists failed to prove a definite nitrifying organism the result of Schloessing and Muntz were attacked anew, and it was again doubted whether organisms played any part at all in nitrification.

At this stage the famous Winogradsky, of Zurich, took the question up, and by his masterly handling of the subject produced definite and important results,

From the experience gained by experimenting with such a large number of different organisms during several years, and by the foremost bacteriologists, it had become apparent that those capable of introducing nitrification could not be numerous, and that probably only one or two might exclusively possess this characteristic. It had, moreover, become plain to him that the organism in question did not thrive on the ordinary nutrient media composed of organic substances in general use for the official cultivation of pathogenic and other microbes. Winogradsky very ingeniously took advantage of this peculiarity. By showing ordinary gelatine plates with cultures derived from various soil bacteria, he induced a vigorous growth of species that flourished in this medium, and then grafted in suitable fluids from the spots which showed no development. Thus he succeeded in separating the nitrifying organisms. Further discussion of the methods, of manipulation is needless, but he ultimately proved a somewhat oval-shaped organism to be possessed of the characteristic power to nitrify ammonium salts,

The puzzle was solved at last, and led to more definite studies being continued by Winogradsky and others. The technique of bacteriology had meanwhile been enriched by the clever invention of Kuhne, who provided a solid culture medium free from organic substances by gelatinising silica. This allowed of reliable work being done in a more rapid manner.

Several species, or may-be varieties, of nitrate-producing organisms have been detected in soils from different parts of the globe, and it seems fairly certain that nitrifying organisms are universally distributed and found in most soils, but are present in greatest number in fertile areas. Less is known of the nitrate-forming organisms, and

it is surmised by some that these many possibly be a modified stage, so to say, of the former.

From experiments made in laboratories it has been ascertained that in cultures seeded with soil the development of nitrites precedes that of nitrates. Thus ammonia is first converted into nitrous acid, and this latter into nitric acid.

This has led to the conclusion that two physiologically distinct organisms are required to accomplish the transformation of ammonia into nitrates. Winogradsky is of this opinion, and claims to have separated the nitrate-forming microbe.

He has proposed for the group of nitrifying organisms the name of *nitrobacteria*, giving the generic term *Nitrosomonas* to the nitrate-forming types, and *Nitrobacter* to those who transform nitrites into nitrates.

NITROGEN-FIXING BACTERIA.

Besides the nitrifying bacteria which are able to transform ammonium salts found naturally in soil, or have been added thereto, into other nitrogenous compounds, a number of related organisms are met with in many fields which have the power of utilising the free nitrogen of the atmosphere and drawing from this vast store of almost inert gas considerable quantities for plant-food. These are the nitrogen-fixing bacteria.

On the rootlets of many higher plants, more especially on those of the *Leguminosæ*, small nodules in varying numbers are found produced by and filled with bacteria. It is supposed that by the *symbiosis* (a living together) of these lowest forms of plant-life with the higher plants, the latter derive the nitrogenous food which it is proved cannot have been derived from the soil, and therefore must have been obtained from the atmosphere. The process is not yet properly understood, but the general opinion tends towards the assumption that the bacteria fix the free nitrogen within the nodules and that the resulting nitrogenous compounds are assimilated by the host-plant. By some also it is thought that through the peculiar conditions of "living together" the plant is enabled to fix free nitrogen in its foliage.

Whatever may be the correct theory, the effect of this remarkable inter-action between the lower forms and the higher plants is very striking and very variable in extent. Even amongst the *Leguminosæ*, the plants deriving the greatest advantage from this phenomenon, extremes are met with; some deriving apparently but little benefit from it, whilst on the other hand many may very largely depend upon it. Amongst the Lupines, for instance, the yellow-flowering variety is able to entirely dispense with nitrogenous substances in the soil.

Through the exhaustive investigations made first by Professors Hellriegel and Willsarth; and later by Lawest, Gilbert, and others, on nearly all the cultivated leguminous plants, no doubt has been left that the nodules found on the roots are formed through bacteria, and that these are able to fix free nitrogen for the use of tho plant they attach themselves to. Until Hellriegel proved that the presence of bacteria is necessary to enable plants to utilise the nitrogen of the atmosphere, and that, for this reason, *Leguminosae* may almost entirely dispense with nitrogenous manuring of the soil they grow upon, and in many instances even enrich the land with nitrogen, these observed facts were not properly understood.

It is well-known in practice that clover and lucerne would grow vigorously for a period of years without being manured, and when flagging could often be invigorated by a dressing with gypsum. This tends to provo that these crops did not sicken for the want of nitrogenous food, but on account of other elements becoming exhausted or unobtainable for some reason from the soil.

A palpable proof that the help of bacteria is almost absolutely necessary to enable plants to assimilate atmospheric nitrogen is afforded by the fact that seedlings, say, of peas, will not thrive unless the soil contains at least some traces of nitrogenous compounds; but as soon as they have made a start and have sent out rootlets upon which the bacteria can form colonies, they prosper independently of the presence of this food in the soil.

During the experiments carried on in several German agricultural establishments it was discovered that every species of legumes was associated with a specially sympathetic bacterium which would not perform the office of fixing nitrogen for other species. Based upon the acquisition of this knowledge, Professor Nobbe, of Tharand, in Saxony, is now preparing a number of pure cultures of these specific bacteria for the purpose of sowing them together with their respective culture plants. These cultures are placed on the market under the name of *Nitragen*, and for some timo have been undergoing and still undergo practical tests regarding the efficacy of promoting the growth of plants.

It has not been definitely acertained how long these artificial cultures can retain their vitality unimpaired; and, besides, in some instances, adverse seasons have prevented a definite judgment being arrived at as yet, whether the results obtained in trial plots can be maintained on a larger scale in the field. Considerable attention is being paid to this question at the agricultural stations in Germany as well as in the United States and elsewhere.

THE DE-NITRIFYING BACTERIA.

In addition to the organisms hitherto referred to, all of which are pre-eminently friendly to plant-life, and thus indirectly to man, there are a host of other bacteria met with in soil and water which play an important part in connection with agriculture.

Their action is to reduce the compound organic substances into less complex combinations, or into simple elements, and in this manner make them again available for plants to which otherwise they would be lost, as these can utilise nothing but elements or simple compounds for their nutrition.

It is manifest that, were it not for the decomposition of the many complex substances taken from the earth in the shape of plants and animals, after these have changed from the active state called life to that of inactivity or death, and by this process are redissolved periodically, these substances would be entirely lost to succeeding generations of plants and animals, and this constant drain from the resources now found on the surface of the globe would ultimately exhaust their supply and make life impossible.

That putrefaction and other processes of decompositions are produced by bacteria was suspected for a considerable time, but it was not definitely proved till 1875 by Menzel, and subsequently verified by others. The action of these organisms is so variable that in the decomposition of any given substance probably a dozen species participate.

From this indisputable achievement of scientific research it will be seen that it is in the first instance entirely due to the activity of the minutest organisms that what is of earth goes back to it again by the dissolution into simpler substances of the complex and intricate combinations. Chemical action, no doubt, has also much to do with the redissolution; but it is now accepted that this activity in the generality of instances is secondary to the bacterial, and takes place after these have broken up the compounds.

Without the one process the other would not take place, and from this it is evident that micro-organisms are more closely connected with the productiveness of the soil than was dreamt of less than thirty years ago, and that not only in medicine and industrial pursuits, but also from an agronomic point of view, bacteriology is becoming daily of greater importance.

The organisms intimately connected with the fertility of the soil may conveniently be divided into two groups, namely, assimilating and destructive bacteria.

Under the first group we would classify the nitrifying and the nitrogen-fixing bacteria; and in the second all species which canse putrefaction and decomposition may be included.

The first group, as previously stated, includes nothing but beneficial species which are occupied either in building up nitrogenous compounds in the soil—the nitrifying species—or in fixing nitrogen from the atmosphere—the nitrogen-fixing bacteria—the latter of which, besides assisting plants to use this element, frequently also enrich the soil itself.

Important as is the numerous second group on account of the reducing power of its species, it includes several that act disadvantageously in regard to agriculture.

These objectionable species are the de-nitrifying organisms. By denitrification is understood the deoxidation nitrates and nitrites, which in each case involves a loss by either nitrogen or ammonia being given off. Their activity is perceptible by the pungent smell of ammonia rising from fresh stable manure, particularly from that of horses. Nitrogen being odourless, its loss cannot be perceived by the senses; it nevertheless takes place to some extent during every process of decomposition where nitrogenous compounds are present.

THE AIMS OF SOIL BACTERIOLOGY.

It now remains to indicate the aims of Bacteriology in connection with agriculture. These are shortly as follows:—

1 To encourage a definite multiplication of the nitrifying organisms found already in the fields, by adding substances that will enable them to retain their vitality and vigour after their activity ceases for the want of nitrogenous material; and in case of their absence from a soil to transplant them thereto, if this can conveniently be done, by adding soil impregnated with the desired bacteria.

2. To secure by the growth of plants favourable to nitrogen-fixing organisms an enrichment of the soil by nitrogenous compounds; and

3. To counteract the sudden and excessive development of the denitrifying organisms, in order to prevent loss of fertilising substances by means of these later.—*Journal of the Department of Agriculture of Western Australia.*

ORANGE CULTIVATION IN CEYLON.

With tea in its present parlous state, it behoves us to look about for some other prodnct to assist the struggling planter and to help him to eke out the lean years. I have seen several references to orange growing in your columns, but do not think the importance of this culture has been sufficiently urged. I am of opinion that orange growing, and the growing of citrus fruits generally, will in many cases not only materially assist many estates suffering from a depressed tea market, but, in suitable locations, lead to the up-rooting of tea to give place to a product infinitely more profitable.

I have found, in course of conversation with planters and others in Ceylon, that they had not seriously looked on orange growing as an industry. For the information of all such I may quote from the Californian State Board of Trade retnrns for 1898, which gives the value of a year's shipment of oranges and lemons out of that State as $7,226,356, or equivalent to R22,000,000. This is from one State alone, and is exclusive of the consumption of the local population numbering a million and a qnarter.

The annual importation of oranges into the United Kingdom exceeds 200,000,000, and this does not include any of the Californian crop already referred to, which gets no further than the Northern States. Two hundred million oranges seems a large number, but it is not six oranges per annum per head of the population, a consumption which cannot be regarded as excessive. It has also to be remembered that in the event of importations being made into the United Kingdom from Ceylon, they would not come into competition with the present imports, as the Ceylon crop would strike the market when it was bare of the fruit, viz., from May to September right through the heat of summer, and just when this delicious thirst-quenching fruit would be most appreciated. On a recent visit to the old country I noted carefully the advent of the season's supply. The first oranges to appear were from Jamaica, and came in at the beginning of November, and sold at from 2d. to 3d. each, and these were followed at intervals up to January, by supplies from Sicily, Italy, &c., when they came in in large quantities. I was informed by a leading firm of London fruit-brokers that shipments received from May to October would undoubtedly command high prices.

The Importations from Jamaica, which I have referred to, are an example for Ceylon of a new industry, which dates its origin from the initiative action of Sir William Robinson, formerly Governor of that island, who in 1891 issued broadcast to the agricultural population a printed message urging the wholesale planting of orange trees, pointing out the large trade that lay at their hands, and offering prizes for the best cultivated blocks under that fruit within a given time. The result of these measures is a steadily-increasing trade with the mother-country. What Jamaica has done Ceylon can do.

That the best varieties of the orange will thrive in many parts of the island is now known, as small importations of grafted trees of good sorts have been made during the past few years, and their success has been snch as to justify their being planted on a commercial scale.

Trees planted three years ago have already begun to bear, and it is here that the great advantage is seen of planting grafted trees instead of seedlings. Not only can the variety and excellence of the fruit produced be calculated on with perfect accuracy, if the young trees are procured from a reliable source, but, under proper cultivation and attention, the trees will begin to bear at from two to three years from planting, as compared with the eight or nine years one has to wait for fruit from a seedling tree, in addition to which there is the uncertainty as to whether the fruit, when it does at last appear, will be an orange or a worthless throw-back of the sweet lime persuasion.

Wickson, the leading Californian authority on orange culture, states in his official decription of the Washington navel orange, which is recognised as the finest variety in the world (and of which there are a few hundred specimens doing well in the island, some having already fruited and been proved true to type) that it begins to bear as early as *one year from the graft.*

The results of the few instances of lemon planting in the island have been even more satisfactory, if possible, than with the orange, by reason of the tree being naturally a more rapid grower. Trees planted three years ago are now bearing well in the Dikoya District. Lemons are always in demand in the London market, and there are periods of the year when high prices are realized for them. The tree is hardier than the orange, and as it apparently does not require such richness of soil and general favourableness of conditions to develop the acid which is the charm of the lemon, as it does for the production of the sugar which is essential to a good orange, the lemon might profitably be grown along with the orange up the inferior portions of a block.

As regards the profits to be made from orange and lemon culture, it would be easy to take the crop produced by a given tree, multiply it by so many trees to the acre and calculate the valne according to the present market price. Were I to do that the result would be such as to make the mouths of many a truggling tea planter water with prospects of riches

beyond the dreams of avarice. This is a calculation, therefore, that I prefer not to make in these columns, but I may mention the fact that there are mature orange trees in Ceylon which produce their crops not by hundreds, but by thousands per annum, that the usual number of trees to the acre is from 100 to 150, and that decent oranges cannot be had in Colombo under five cents a piece! In my opinion it will be a good many years before the local demand for good oranges is satisfied. As soon as they are available, I predict that they will displace the present supply of worthless green and sour fruit which is a disgrace to the age of this colony. It is a matter for surprise that up to date so little has been done to introduce the first-class named varieties of the orange which are well-known in most if not all countries where citrus fruit can be grown. Here an orange is simply an orange and nothing more whereas there are about a dozen distinct named varieties, each with its own special characteristics by means of which identification can be made.

I would urge the advisability of making experimental plantings of the orange and lemon as far as possible all over the island, and especially at elevations between 2,000 and 5,000 feet, which so far seem to suit best the kinds that have been introduced. A variety which does well in the low country would be a boon to Ceylon, as suitable land in the shape of rich flats and easy slopes is more plentiful there than in the hill districts. Such a variety will no doubt be fixed upon before long, as plantings were made last year in different parts of the low country. At present all trees have to be imported, but with local nurseries and a few natives trained to graft and bud the seedling trees, a supply of plants could be produced at a slight cost as compared with the expense of importing the trees, and there is a good opening for anyone who cares to take this nursery business up, although two years' time would necessarily elapse before any saleable stock would be available.—Local "Times."

RISE OF THE SUGAR INDUSTRY OF JAVA.

Under this headidg the *Journal des Fabricants de Sucre* prints an account of the extraordinary conditions of sugar production in Java. According to an official report, the production for the last three years has been as follows:—

Year	Factories in Operation	Production in Tons.
1896	187	534,390
1897	188	586,299
1898	188	725,030

Java, therefore, produces as much sugar as France with less than one-half the number of factories.

The astonishing part, however, is in the yield obtained per acre. The figures are these:—

Year	Cane per hectare in kg.
1896	76,900
1897	85,400
1898	98,700

The yields of beets in Europe is about 25,000 to 30,000 kg. per hectare on an average.

If the foregoing figures are astonishing, the following are simply fabulous. They represent the sugar per hectare in Java:—

Year	Sugar Extracts per hectare in kg.
1896	8,100
1897	8,600
1898	10,100

Compare these figures of 8,000 to 10,000 kilogrammes per hectare to those of Germany, where they have only 4,000 kg.

On the other hand, the yield in the factory went lower than Java. The amount of raw sugar extracted from the sugar cane by weight was as follows:—

Year	Field in per cent
1896	10 55
1897	10·06
1898	10·21

The factories which obtained more than 40,000 kg. of sugar per hectare were only 11 in number in 1896, in 1897 they numbered 30, and 1898 they had reached the number of 87.

Die Deutche Zuckerindustrie says in connection with this subject: "This enormous superiority of the cane-sugar industry over the beet-sugar industry would increase still more if the bounty was taken off. The only possibility of keeping up the fight against so privileged a competitor rests in the value added by the bounty to the products of the beet. If by the abolition of the bounty the cane-sugar and the beet-sugar industries were placed on an equal footing from the point of view of realising on their products, the fate of the beet-sugar industry would be sealed. And in considering the foregoing results, one speedily acquires the conviction that the progress of the colonial industry is far from having reached its highest point, whereas one hardly perceives any noteworthy progress to be realised in agriculture and manufacturing in Europe."

The French paper agrees with the idea that the development of agriculture and industry in certain countries affords grounds of apprehension for the beet-sugar industry of Europe, but it differs as to the future of the latter. It believes that under the stimulus of necessity it will make great progress and reduce the cost of production so materially that it will have a long series of years of successful existence.—*Planters Monthly.*

ADVENTURES WITH A BISON.

I had often heard stories of people being charged by bison; but as so many men say it has never happened to them, and that really the bison is a most harmless creature, I thought the stories were "yarns"; but now I am wiser.

About a week ago, C. and I. started forth to try and slay a bull, of which there are a goodly number in the forests which I have to look after. I had been after them a great many times, but had only been able to get one, rather a poor one. Well, the first day, we came up to a herd, and after a lot of crawling (and this is not easy when you have to crawl with a double 8-bore, weighing 18lbs.) managed to see that there was a good bull in the herd. Here let me digress for a minute, to tell you that it is easy enough to shoot a bison, but to get a good bull out of a herd requires an awful lot of stalking as the confounded cows and young bulls always promenade about and offer such easy shots, at the same time getting right between you and the bull. Perhaps, he, being boss of the show, gives them instructions to do it! Anyhow, it is very annoying of them, and in this particular instance they carried out my lord's orders to perfection, and C., whose shot it was, could not get more than a glimpse of him. After about half-an-hour's waiting, during which the cows—who saw, or smelt, that something was wrong—kept walking about and snorting at us, there was a loud snort and away they went. Well, I fear that I am not getting on very well with my yarn, but I am not used to "writing to the papers." Suffice it to say that two people trudged most of that day without food or drink and never saw the bison again. But next day made up for the disappointment of the first.

We started off at some unearthly hour (about 3 A.M. I should think), and when we got out to the swamp, which is a favourite feeding-ground both of bison and elephants, we came on the tracks of a solitary bull. It was my shot this time, and after a very short track, one of the trusty jungle men spotted

master bison lying down about 5 yards off. I went up to the place, but could see nothing, for those confounded Kurumbers (jungle-men) can see in the dark, and while I was "fooling around," up he got; I caught sight of a great black mountain rushing away acros my front; he was so near (about 6 yards) that I could not resist the temptation, and let drive. Snap-shooting, when you have the above-named 8-bore, loaded with 12 drams of powder, is foolishness, but by a lucky chance I hit the beast and knocked him over. In a minute he got up and went off. We waited a bit to give him time to die as the track was covered with blood on both sides which made us think he was very badly hit, and then we cautiously went after him, mounted on my *shikar* elephant, I in front and C. behind. After about half-a-mile we came to a place where he had lain down, so making the Kurumbers walk behind the elephant we went on. I suddenly caught sight of an ear moving behind a bush about 20 yards in front, and told the *mahout* to stop the elephant, as I wanted to put in a shot where I calculated his shoulder to be. One can't talk out loud to the elephant on these occasions, so the *mahout* touched him on the head. The idiot of an elephant (and really wasn't he an idiot not to see the bison, if I could see it ?) stopped and, imagining, I suppose, that we wanted to get off, promptly sat down. This proceeding was a bit too much for our friend, the bison, who came charging out like an express train straight for us. You bet, the elephant got up sharp enough, and as soon as this operation was finished, I let drive as best I could. No effect; the bison came on and went full tilt into the elephant's forehead; what with the smoke and the elephant's swaying up and down, I could not see to shoot again at once. The bison naturally recoiled somewhat (most people would if they had charged an elephant), but he was not going to be put off, and promptly closed again. This time I was able to lean over the elephant's head, and pour the contents of the second barrel into the broad back of the bull. He subsided gracefully, and then (and thank goodness it wasn't sooner) the elephant turned tail, and bolted. It was a nasty place with a lot of dead bamboos sticking up, and one of these caught C. in the back and knocked him off, rifle, hat and all. I was too much occupied with looking out for bamboos and trees, to pay much attention to C. but I knew he must have fallen rather nearer to the bull than was nice. Well, we managed to stop the elephant, and I ran back (nothing would induce the elephant to go back) expecting to find the bull executing a war-dance on the the top of C., but luckily I found him and the Kurumbers all safe and sound. What was to be done now? That was rather a ticklish question. We could hear the bull lying groaning where he had fallen, but I confess we both decidedly considered discretion the better part, as the beast was lying in the middle of a lot of fallen bamboos and long grass, and if he had tackled us at close quarters—well, we might be there now. However, he got up and moved slowly off. We followed at a respectful distance, and though I saw him again I could not get in a shot, and as it was getting pretty late, we decided to leave him to himself for the night. Next day, as we thought he must be dead, we sent the men to see, but far from being dead he charged them twice, they skipping up trees.

Next day I came up to him, but he bolted before I got a shot, and it was only on the fourth day that I found him standing in some thick jungle, and was able to kill him.

Poor beast, he must have had a bad time of it for those four days, He had eaten nothing and must have been in great pain, and I was really glad, both for his own sake and mine, that I managed to kill him,

He was a very big bull, standing 5 feet 11 inches at the shoulder (measure an ordinary English bull and see what that means), but he had not got a very big head. His horns measured 36 inches across the sweep, and were 19 inches round at the base. The points were very much worn; he had lost 3 teeth, and his hoofs were almost worn down to the bone, so he must have been a veteran, and no doubt a very grumpy old chap, too.

I am afraid I have spun this yarn out much longer than it ought to have been, and if it is very dry reading, well, you need not publish it.

Let me, however, give a small parting word of advice, and that is that anyone who is likely to get any bison shooting when he comes out here should not use a pop-gun. I believe if I had not had an 8 bore on this occasion, and that loaded with 12 drams of powder, I should not be inflicting this interminable yarn on the patience of your readers.—*Indian Forester.*

AMOUNT OF FARM AND GARDEN SEEDS REQUIRED PER ACRE.

It may be of advantage to farmers who have only lately settled on the land and particularly to some who may have entered on the business for the first time in Queensland, to know how much seed to purchase for sowing or planting various crops. Although there are certain crops which may practically be sown and raised all the year round in this favoured climate, yet the regular seasons for most crops are quite as clearly defined as they are in other colder or hotter countries. Some modification of the times for sowing and of the amount of seed to sow will have to be made in different parts of the colony, owing to the wide range of temperature and rainfall, and to the variety of soils and their aspect. But as a general rule, the following will be found fairly correct, the quantities in all cases being per acre:—Barley, broadcast, 1 to 1½ bushels; drilled, ½ bushel. Beans (broad), drilled, 1½ bushels; (French), 1½ bushels; (horse), 2 bushels. Beet (drilled), 5 lb. Buckwheat, broadcast, 1 to 2 bushels. Cabbage (field), in seed beds, 2 lb. Carrots, drilled, 5 to 7 lb. Clover, broadcast, 12 to 20 lb. Grasses, prairie 1 bushel: Italian rye, 4 bushels, perennial rye, 2 bushels; rib, ½ bushel; couch ½ bushel; permanent mixed pasture, 3 bushels; imphee, 20 lb.; khol-rabi, drilled, 2½ lb. Lucerne broadcast, 20 lb.; drilled, 10 lb. Maize, broadcast, 3 bushels; drilled, ½ bushel. Mangolds, drilled 5 to 6 lb. Millet, broadcast, 1 bushel. Oats, broadcast, 2 bushels. Onions, broadcast, 5 lb.; drilled for sets 20 lb. Panicum, broadcast, 20 lb. Parsnips, drilled 8 to 10 lb. Peas, broadcast, 3½ bushels; drilled, 2 bushels. Potatoes, 14 cwt. of cut setts; if planted with the American potato planter, 10 cwt. Rye for grain, broadcast, ¾ bushel. If for saddlers' use, 1½ bushels. Sorghum for grain in drills 10 lb., broadcast for green fodder 20 lb. Swedes, 3 lb. to 4 lb. Turnips, globe and yellow, drilled, 2 lb. Vetches broadcast, 3 bushels. Wheat, broadcast, 1 to 1½ bushels.; drilled, ½ bushel. Paddy (rice), 30 to 40 lb. Cow Peas, 8 lb. Jerusalem artichoke, 3 to 4 cwt.

The weights per bushel of the principal farm seeds enumerated above are:—

Barley, 50 lb; beans, 60 lb; buckwheat, 50 lb; couch, grass, 40 lb; cocksfoot, 20 lb,; clover, 60 lb; flax, 60 lb; grasses (mixed); 20 lb.; oats, 40 lb.; imphee; 40 lb; prairie grass, 20 lb; perennial rye grass, 20 lb; peas, 60 lb; rye 60 lb; rib grass, 60 lb; sorghum, 40 lb; lucerne; panicum, 60 lb; maize, 56 lb; wheat, 60 lb.—*Queensland Agricultural Journal.*

THE NAGPUR EXPERIMENTAL FARM IN THE CENTRAL PROVINCES.

It is not stated with what object the Ceara rubber plants are being planted, but the experiment is likely to suceed, as many be gathered from the following

notes on the subject collected by Mr. Reuther, I.F.S., and roprodnced below :—

MANIHOT GLAZIOVII (Ceara).

Climate.—Thrives nnder a very wide range of conditions. *M Ceara*, grows even in desert plains with raiufall under 50 inches, where the vegetation is scorched up during the greater part of the year, and thrives also on mountains up to 3,500 feet elevation, where the rainfall reaches 100 inches and the night temperature falls even below 60°. A rainfall of 60 inches to 70 inches is ordinarily sufficient, but about 100 inches suits the tree better. In Ceylon, thrives up to 3,000 feet elevation.

Soil.—M Ceara, thrives best iu scanty soil among granite boulders; never in marshy soil. Though growing readily on hillsides in poor, rocky soil, unsuited to almost any agricultural crop, it thrives best where the ground is covered with shrubs.

In Ceylon, grows on most barren soils.

Characteristics.—A moderate-sized tree, with erect stem 30 feet to 50 feet high and 2½ to 5¼ feet girth (at 3 feet from the ground). Rounded crown.

Hardy, adaptable, fast grower; not prone to insect or fungoid attack; requires little or no attention once established.

Readily raised from seed ; can be propagated from cuttings as easily as willow. In every part of the world where it has been introduced, the seed production is abundant, and the seed may be gathered already at 3 to 5 years of age. Large areas could therefore be planted in short time: In Brazil the seed is universally sown directly in the plots which the trees are intended ultimately to occupy (just like teak seed in *taungya* plantations), and nurseries and transplanting are not required.

ARTIFICIAL CULTIVATION.

Spacing.—Recommended to be planted thickly, with judicious thinuing to follow.

Germination.—Seed-coat hard and thick; said to require more than a year to germinate. But germination inducible within two or three weeks by rasping off with a file both edges at the radicular eud (recognizable externally by the two-lobed caruncle).

Development.—In Ceylon, attains in 2½ years a height of 25 feet to 30 feet and girth of 1 foot 9 inches at 3 feet from the ground. Flowers at 18 months of age.

Rubber.—Quality excellent: second only to the best 'Para." Yield equal in quantity to that of "Para."—*ndian Forester.*

THE TAPIOCA PLANT.

An interesting correspondence between Dr, Watt, the Reporter on Economic Products, the Secretary of State for India, and Mr. Robert Thomson, concerning the value of the tubers of the Cassava or Tapioca plant, as an alternative food-stuff in seasons of scarcity and famine, has been published as an "Agricultural Ledger." Mr. Thomson urges that the numerous varieties of the Cassava cultivated in Columbia should be introduced to India where, he declares, if widely distributed as a subsidiary crop to rice it would ward off famine. The Columbian varieties of Cassava, he says, flourish with a total annual rainfall of from 14 to 16 inches, while the plant thrives admirably when droughts extend over six months at a time. It is thus pre-eminently a drought-resisting crop, while rice requires from 50 to 60 inches of rain in a year. Some of the varieties grow in rich soil, and some in exhausted or impoverished soil ; and while certain varieties are cultivated on the hot plains others are grown at elevations up to 6,000 feet above sea level. Dr. Watt declared that he had little faith in the value of acclimatisation in the abstract, in the improvement of the resources of a country, and he doubted whether one per cent of the experiments hitherto performed in India of that nature had proved of practical value. The development of the existing resources by selection was, he stated, infinitely more satisfactory. With that object in view, he was endeavouring to obtain information of the extent of the food supplies of India of the nature mentioned. Mr. Thomson replied that Cassava was chiefly known in India as a source of Tapioca, but the Columbian varieties had been cultivated in that country from time immemorial, and they were the result of slow and gradual selection. His experience ot tropical planting in regard to acclimatisation differed from that of Dr. Watt. To raise new varieties or races from the existing Indian varieties which are found only in restricted areas would, in Mr. Thomson's opinion, take a long period of years, whereas a score of valuable new varieties are immediately obtainable from Columbia. There is every reason to believe, he observes, that these would readily accommodate themselves to a wide area of India. The last word so far, however, falls to Dr. Watt who, as the Editor of the "Agricultural Leder," remarks in a foot-note that it is probable that a few years would suffice to reduce all the various forms to which Mr. Thomson alludes to two or three, and that these would not differ materially from the acclimatised varieties already met with in India.—*The Indian Agriculturist.*

CAOUTCHOUC PLANTATIONS IN ASSAM.

BY W. R. FISHER, B.A., I.F.S.

I see, in the report on the caoutchouc plantations in Assam, a statement that the Bomani Hill plantation yielded 9·5 lb. of clean rubber per acre, and that the Charduar plantation yielded 9·4 lb., there being 92 trees per acre on the Bomani Hill and 14 per acre on the Charduar. Mr. McKee remarks that this proves that a densely-planted area does not yield more rubber than one sparsely planted, while it must have cost more to plant out originally and to establish as a going concern.

I chose the site for both these plantations in 1873-74, and managed them for about two years. In the Charduar plantation, lines forty feet wide were cut one hundred feet apart in dense evergreen forest, full of cane-brakes, large Ficus trees and other difficulties. Colonel Keating, the Chief Commissioner of Assam, was struck with the waste of timber this involved and the great expense of clearing the line, and directed that an experimental plantation should be made on grass land near the Brahmaputra River. Mr. Mann, the Conservator of Forests, considered that trees grown on grass land would not yield anything like the same supply of caoutchouc, as trees grown in the humid air of the evergreen forest, and his opinion was based on the fact that some large trees that had been tapped in Tejpur yielded very little rubber. The plantation on grass land at Bomani Hill was therefore limited to a small experimental area. The expenditure on it, however, was a mere fraction of the cost of the Charduar plantation, as far as I remember, and it would be interesting if the Assam Forest Department were to publish figures showing the comparative cost of the two plantations per acre, now that it has been proved that they return an equal yield per acre.

If grass land plantations like that at Bomani Hill will afford as good a yield as the forest land plantations in Charduar, a great future may be predicted for rubber-planting in Assam, and there are, or were in my time, enormous areas of waste grass land in that Province.—*Indian Forester.*

RICE AS A FOOD.

Dr. John Haddon, M.D, writes to the *Rangoon Gazette* :—

In coming to Rangoon, I noticed that there were two ways of boiling rice on board the ship. The rice for the passengers, boiled by a native cook, was put on with cold water, and poured as we pour potatoes. That for the lascars, also prepared by a native cook, was put into a measured quantity of water boiling very fast, and allowed to boil, until all the water was absorbed. It was not poured. Now some may not know that a large amount of the nutritive material of the rice goes into the water in which it is boiled; but that is a fact well-known to chemists. It is thus evident that pouring the rice we are lessening its food value. Some are inclined to regard rice as of comparatively little value as a food, and it is not uncommon to hear Anglo-Indians saying that the natives, who live mostly upon rice, have to eat an enormous quantity of it. If it be really necessary, in living upon rice, to eat a larger quantity than the stomach can accommodate with comfort, how careful should those who so live be not to deprive the rice of any of its nutritive material, since it is evident that if a certain quantity of dry rice must be eaten to support life (according to the calculation of physiological, chemists) those who pour their rice will not be so well fed, as those who do not pour it, if they both eat the same quantity of dry rice? And again, if the natives require to take an enormous quantity of rice, to live upon it alone, they will require to take more of that which has been poured, than of that which has not been poured and retains more of its nutritive value. Granting my premises then, the logical conclusion is that rice must not be poured and, from personal experience, I believe it is best to put the rice into the water when it is boiling fast, but I do not wish to say more about that at present.

Perhaps the most important question with regard to rice, is as to its cleaning, or milling. We require, in a perfect food, a certain proportion of albuminoid, carbonaceous, and mineral material. Unless we have these in proper proportions, our health suffers. The albumenoids go to supply the waste of our tissues, caused by the vital processes, and the amount of muscular effort put forth in work. The carbonaceous goes to supply us with energy. It is like the coal in the fire, the combustion of which heats the boiler, and makes the steam, which gives the engine all its power. Starch is one of the principal ingredients in our food for the supply of energy, and it exists in large quantity in all our cereals. The mineral material goes to the formation of bone, and supplies us with salts which are absolutely necessary for health. We are only just beginning to realise that it is the want of these mineral salts in animal food (its sin of omission, as it were) which helps to produce gout in its protean forms, making such ravages, as it does, in those of sedentary habits, who indulge in the pleasures of the table. A London physician, who has been studying the question of diet, in relation to gout, is endeavouring to obtain the ashes of vegetables which contain so largely what we may call these anti-gouty salts in such a form that it could be used instead of our ordinary table salt, but surely it would be wiser to eat such food as contains these salts. If we examine wheat, we find that these salts are contained in the bran, which is entirely removed from wheat by millers in making the fine white flour, and given to cattle. The bran, however, contains not only the salts, but a large proportion of albuminoid material, which we require to build up the waste of our tissues. Such knowledge has induced some doctors to recommend the used of bread made from whole wheat meal, and many who have found the benefit derived from eating such bread keep handmills in which they grind the wheat as got from the farmer, just as they require it; and they find the bread made from such freshly-ground meal much better than that from meal which they can buy, seeing that such meal does not keep well. Dr. Keith, who visited Rangoon two years ago, made some enquiries as to rice, which he put into an article in *Chambers' Journal.* He states that so much as 16 per cent of what is called rice meal is taken from the rice, in the process of milling. An analysis of the rice meal made by Messrs. Duncan and Flockhart, of Edinburgh proves that rice meal (which is sold for feeding cattle) contains 12½ per cent of albuminoids, and 4½ per cent of phosphoric acid, which, in union with lime, as phosphate of lime, makes up the greater part of the ash amounting to 7¾ per cent. Parkes gives 5 per cent as the proportion of albuminoids in white rice. Thus we learn that rice meal has more than double the amount of albuminoids that the best rice contains, and as it has in addition all the mineral salts, which we know to be so necessary for the system, it is evident that rice meal is a valuable food, and that in taking it off the rice we are making the same mistake, as we so long did in taking the bran off wheat and giving it to cattle.

What then is the lesson we should learn from these facts? It is very evident. We should leave as much as possible of what rice meal consists of on the rice, and use it in that state for human food. If we could keep it all, we would have instead of only 5 per cent of albuminoids, and no mineral salts, 17½ per cent of albuminoids and plenty of the mineral salts, so that in that state rice alone would be an excellent food. The natives mix dal with their rice, and in doing so they do well, so long as they use white rice, since the dal is rich in albuminiond material, but if they used the brown rice they would not require any dal. This is a question which ought to interest all who have the welfare of the natives in this country at heart and the Government might do something to encourage the millers to turn out the rice with its invaluable nutritive material retained. If it will not keep long enough for exportation all ground up, as we grind our wheat, when we make whole wheat meal, it might be sent home in the brown state, and ground in mills there, for home consumption. In that state it makes an excellent porridge, and might be used by our

peasantry instead of the oatmeal porridge upon which their forefeathers lived and which their degenerate children have almost entirely discarded. How greatly such a change would increase the consumption of rice at home! I trust that these facts with regard to a food so wholesome and invigorating as rice may reach those interested in that industry, and that brown rice may be properly appreciated in the near future.—*The Indian Agriculturist.*

FLOWERING OF THE BAMBOO IN THE C. P

By A. Smythies, B.A., I.F.S.

A somewhat remarkable event is taking place in the Chanda district of the Central Provinces, and that is the flowering on a large scale of the ordinary bamboo (*Dendrocalamus strictus*). The area over which the flowering extends is estimated at 1,200 square miles, and in this area, although a few clumps here and there have escaped, the phenomenon is universal. But the extraordinary point about it is that clumps of all ages are flowering —not only mature clumps but quite slender seedlings of six or seven years' growth, or even less. I send you some specimens to illustrate this; the rhizomes show that those clumps are quite young. Last year the droughts affected the bamboos in the Dhaba Range of this district, and the bamboo flowered over a small area, and produced a kind of manna, which was described in the Forester (Vol. XXVI., page 363). Many thousands of people were kept alive for some weeks on the seed. This year the area is infinitely larger, and the whole population will, in course of time, flock to the forests to gather the seed.

The consequences to the people in the vicinity of this flowering and subsequent death of the bamboo will be rather serious, as, for many years to come, they will not be able to find sufficient stores to satisfy the numerous wants of the agricultural population to the north and west of Chanda—at any rate, the price of bamboos will be very much higher.

The Government revenue which now amounts to about R20,000 from this source will also suffer, as, when the dead bamboos have been utilized, there will be no more available for some 15 years or so. It would be interesting to ascertain whether such a universal flowering of this particular species has been recorded before. Needles to say, the oldest inhabitant has no recollection of such an event, and the flowering of the smallest clumps is believed to be unique.

It is probable that in this district, at least, the bamboo does flower gregariously over fairly large areas, as three of the oldest inhabitants informed me that they had seen the bamboo flower twice: first, when they were about 10 years old. Their ages were probably quite 70. Hence it is not unlikely that this bamboo flowers at intervals of about 30 years.

[*We would refer our readers to Volume XXV. (1899) of the "Indian Forester," pages 1—25, and 305, 306.—Hon. Ed*]

PYTHON-BREEDING AT THE CALCUTTA ZOO.

It is not often that one has the opportunity of seeing a pythoness hatching its eggs, and those who were lucky enough to visit the Zoologica Gardens last May might have witnessed the unique sight. The eggs are about twice the size of duck's eggs, and exhibit a leathery crumpled-up appearance, as if they were small bladders not properly distended with air, their colour, however, is a dirty white, and their covering might be compared to the skin of a mushroom. The pythoness which appears to be aboutthirteen feet in length, and whose body in its thickest part must be nearly two feet in diameter, is nursing her eggs in a curious manner. She has coiled herself up in a symmetrical heap till she resembles a basket of which the sides and the lid are her coils; and within this arrangement she has piled up the eggs, which she is so assiduously hatching. It will be interesting to see the little pythons when they make their entrance into the world, for to judge from the size of the eggs, they should be quite six inches in length. The poor mother was so stared at by sight-seers that the authorities took pity upon her and covered up the glass face of the cage with a screen.—*Statesman.*

TREE GROWTH ON IRON SOILS.

In the course of examining a forest area for the purpose of marking off areas of approximately equal capability, I had to walk over two large hills from 1,750 to 1,850 feet high. These hills are covered with dense spear grass, about 3 feet high, among which are hidden boulders of various sizes. There is scarcely a tree over an area of 100 to 150 acres, although an adjacent higher hill is well clothed. The very few trees that do exist are evidently not happy, and consist of dwarf, badly-grown individuals of *Anogeissus, Lagerstrœmia, Terminalia tomentosa, Schrebera*, and *Buchanania.* The hills have often been burnt, but not more so than the adjacent stocked ones. On examination of the boulders I found that they were full of an ore of iron, and would be interested to learn whether there are other cases which point to soil so constituted being inimical to tree growth. Iron occurs in many parts of this district, but I have not observed it in such large quantities elsewhere, nor any marked effect on the crop. Iron.—*Indian Forester.*

Chlorosis in Plants.—Recent researches by Dr. Roux confirm the notion that the yellow condition of the leaves known as chlorosis is due to some deficiency in the chemical constituents of the soil. The liquid absorbed by the roots has an excess of lime, and deficiency of potash and phosphorous. The consequence is a stoppage of the work done in the leaves, and of transpiration ending in the degeneration and death of the cells from starvation.—*ibid.*

Cape Fruit.—Since our last note on this subject, two ships of the Union Castle line have arrived with consignments of some importance, the *Tantallon Castle* bringing 189 boxes of Plums, and 212 boxes of Peaches; and the *Dunottar Castle* with 280 boxes of Plums, 820 boxes of Peaches, and in 18 of Nectarines, from Cape Town. (Since the above was in type we are asked to note the arrival of the *Briton* at Southampton with 2,124 packages of Peaches; 98 of Plums; 120 of Nectarines; and 27 packages of Pines).—*Ibid.*

THE PLUMBAGO MINING COMPANY.

It is refreshing to note the manly enterprising tone which distinguishes the proceedings at this Company's meeting reported on page 762. In the face of multiplied discouragements through unexpected obstacles to work, and repeated disappointments as to "paying veins," there is not a word of idle grumbling in the Directors' Report nor the Chairman's Speech, nor in any of the speakers' remarks. All are determined as plucky Englishmen to persevere and do the fullest justice to the "Kingsbury" mine; and we sincerely trust that this Company may prove a very notable exception to the general rule in Ceylon, that European capitalists do not succeeed in the digging for plumbago; and that worthy, experienced Capt. Tregay may have his faith in the mine amply justified; while Directors and Shareholders may secure a full reward for their courage and persistency.

ARRIVAL OF TROUT OVA FOR THE C.F.C.

FROM WALES.

The N.L. ss. "Prinz Regent Luitpold," which arrived today from London, brought out the first of three consignments of trout ova for the Ceylon Fishing Club for this year. As has previously been stated, owing to the failure of the ova hitherto imported from the Surrey Hatchery of Andrews and Andrews, the Club has indented for the ova from other hatcheries this year; and the consignment which arrived today was shipped on the 30th January last and consists of 15,000 rainbow trout ova and 5,000 brown trout ova from Earl Denbigh's hatcheries in North Wales. Great hopes are entertained of this batch which was received from the ship's hold today by Mr. H D Elhart, who is in charge of the hatcheries and stew ponds of the Ceylon Fishing Club at Nuwara Eliya. He will take the consignment up by tonight's mail train and the boxes will be opened tomorrow morning when the ova will at once be sorted and put out to hatch. It is of course impossible to know at present how the ova has fared during the voyage, but it would appear that great care was bestowed on it while on board and from what Mr. Elhart could judge there would seem to be no smell indicative of decomposition or any such damage and the liveliest anxiety is felt as to the success of the importation. It may be of interest to note that hitherto the P. & O. Company's steamers always brought out the ova and great care was said to have been bestowed on it on the voyage and the C.F.C. has even given gratuities to the stewards of the vessels for devoting such attention to the matter.

THE DELFT BREEDING EXPERIMENT.

RETURN OF DR. STURGESS.

Dr. G. W. Sturgess, Government Veterinary Surgeon, returned from Jaffna this morning by the ss. "Lady Gordon," after a fortnight's absence in the north, on his six-monthly visit to the islands of Delft and Iranativu, where the Government horse-breeding experiment, dating from three or four years back, continues to be carried on with success. Dr. Sturgess, who was seen by our representative this morning, states that there is no disease—either on Delft where the brood mares and foals are kept, or on Iranativu whither the latter are transferred to be reared after reaching a certain age. On Delft there are now about 60 mares and 25 foals, while on Iranativu the young animals number no less than 46. During the present trip 7 three-year-olds (by Raeburn) have been removed from Iranativu to Jaffna, where they are available for sale, and where particulars may be had on application to the Government Agent.

The Value of Ammonia, &c.—Mr. Mitchell Henry (aged 75), trained as a Surgeon and at one time M.P. for Galway, succeeding Governor Gregory when he came to Ceylon, in the course of a letter of reminiscences to the *Spectator* has the following:—"I would ask, what keeps the blood-fluid in the veins and arteries? It is the presence or absence of free ammonia. This remedy was taken up by Mr. Baker Browne, the father of Mr. Lennox Browne, and he discovered and showed that by the administration of ammonia (common smelling-salts) scarlet fever, pneumonia, and other diseases caused by a stasis, or stoppage of the blood in the blood-vessels, could be completely overcome. He wrote a treatise on the treatment of scarlatina, and proved that by the early administration of small doses of ammonia in water, not mixed with anything else, no one need fear scarlatina. I have seen much of this disease, and can confidently corroborate this statement. Any one, however, who goes out of the ordinary line in medicine is called a quack, and that was the fate of Mr. Baker Browne. I learned much from him, and he was the first to perform ovariotomy, which was subsequently taken up by Sir Spencer Wells, who owned Golder's Hill at Hampstead, now bought by the London County Council. But the virtues of ammonia penetrated to Lancashire, and in the large soap factory of the Messrs. Thom, who always kept at their works a large barrel of ammonia and water, every woman used to obtain and keep by her a bottle of this fluid sweetened with a little sugar, to administer to any child who got feverish, a sure sign of incipient stasis of the blood. In my hunting days I have saved several horses, which got pumped out by running and stood breathless with cold ears not able to breathe, by getting some smelling-salts and mixing it with water, and so administering it. Lastly, I will mention another thing that I was taught by Mr. Raetger, a Hungarian. He collected the blood, say of a bullock in a barrel, and when the yellow serum floated on the top, he cut it off and left the black blood corpuscules behind. To those he added a little powdered quicklime, mixed it with bran, and preserved it in brown paper bags hung up in the kitchen like hams, and gave some to his young stock of horses, turkeys and fowls. They throve in a remarkable way, and if others will give some to their domestic fowls with the grain they feed them on, they will see the avidity with which it is consumed and the remarkable effect it has on the birds or on fowls."

THE AGRA TEA COMPANY OF CEYLON LTD.

THE REPORT.

The following is the report :—

The Directors have the pleasure of submitting their report on the transactions of the Company for the year ending 31st December, 1900.

The acreage of the Company's property is as under :—

Tea in full bearing ..	295 acres,	
Do in partial bearing..	27 do	
Do not in bearing ..	8 do	
		330 acres.
Forest		27 do
Grass, waste land, &c. ..		10 do
Total area ..		367 acres.

The estimated crop for 1900 was 180,000 lb. and the out-turn 203,860 lb. or a surplus of 23,860 lb. This crop realized R80,178·64, equivalent to 39·33 cents per lb. as against 41·79 cents in 1899. The expenditure, as shown in the accompanying accounts, was R57,070·60, or about 28 cents per lb. as against 26·89 cents in 1899.

After deduction of R4,158·58 for depreciation on buildings and machinery, the profit on working account for the year amounts to R18,363·96 representing rather more than 4½ per cent on the value of the property as shown in the Balance Sheet.

The net profit for the year amounts to R9,637·76, to which has to be added the sum of R6,337·12 brought forward from 1899. An interim dividend of 2 per cent absorbing R5,590 has been paid, and the balance now at the credit of the Profit and Loss Account is R10,384·88. In view of the fact that funds will shortly be required for the purpose of paying off part of the Standard Life Assurance Company's mortgage, the Directors do not think it advisable to pay any further dividend now, but they propose to transfer R9,888·97 to the General Reserve Account, thus bringing the total of that account up to R24,000 ; and to carry the balance of R495·91 forward to next year's accounts.

Since the issue of last year's report, the vendors of the Kalkudah estate have taken back that property for the price paid by the Company, and have surrendered shares to the value of R60,000, and refunded in cash the amount expended upon the property by the Company. Out of the cash so received the loan of R15,000 over the properties of the Company has been paid off.

The estimated crop for 1901 is 200,000 lb. tea, to be produced at 28 cents per lb., which includes a fair allowance for manuring.

The condition of the Sacharawatte estate continues to be satisfactory in all respects.

In terms of the Articles of Association, Mr. Joseph Fraser retires form the Board of Directors, but is eligible for re-election.

The appointment of an Auditor will rest with the meeting.

PLUMBAGO MINING COMPANY.

THE REPORT.

The Directors have pleasure in presenting to the Shareholders their Report and Accounts for Season ended 31st December, 1900, which represents a period of about nine months from the time the Company was incorporated. The Accounts are brought out up to this date so that the 1st January may commence the financial year of the Company.

The new Shaft started on the 26th March, and now called the "Kingsbury" shaft had been sunk to a depth of 78 feet, and the Cornish Pump imported from England had been erected.

Considerable trouble was experienced in getting the Machinery to the Mine and putting it in working order, but things are now working satisfactorily.

It will be noticed that the Accounts shew Cash in hand to be only R3,924·92, and it will probably be necessary to raise more Capital for the further development of the Mine ; this matter will be discussed at the Meeting.

As Captain Tregay is going down on inspection in a few days' time and a full Report will be obtained from him for presentation to the Meeting further details are unnecessary.

In terms of the Articles of Association all the Directors retire, but being eligible offer themselves for re-election.

The Auditor, Mr. J D Forbes, also offers his services for 1901.

CAPTAIN TREGAY'S REPORT.

Gentlemen,—In handing you this my report for your General Meeting on the 2nd March next, I cannot help expressing a wish that the meeting had been postponed for a couple of months or so, to allow of more extensive explorations being made from the bottom of the Kingsbury shaft which would, doubtless, have enabled me to place before you more definite information as to your prospects than I am in a position to do at present. As you are aware the mine was floated largely on the strength of the two veins intercepted at the 46 feet level of the old shaft, these being the only veins of plumbago I was able to see at the time of my first visit to the mine.

These veins have not yet been tapped at the Kingsbury shaft, consequently I am unable to give you any further information upon your prospects there than I gave you in my first report on the mine.

In sinking the Kingsbury shaft several small veins of plumbago were passed through and numerous very promising indications were met with, which goes to show that the district is highly mineralized, but the fact remains that the two veins seen in the 46 feet level of the old shaft, have not been touched upon yet at a deeper level, and therefore we cannot say if these veins improve in depth or not. This I need hardly say is a most important question to settle.

Your explorations have now reached a very interesting stage, but, nothing definite has actually been arrived at yet.

A very short time now will bring you into touch with the two veins of the 46 feet level, and it is towards this end all our operations hitherto have been directed, hence the wish I expressed at the beginning of this report, that your meeting had been postponed. For the purpose of this report I visited the Iddagoda Mine on the 16th instant, and I am very pleased to say that I found everything going smoothly. Pump and steam-power working well and keeping the water down with ease. Of the difficulties encountered in getting the boiler to the mine and starting the machinery, &c., &c., you are all doubtless aware, and they need not be repeated here. All I need say is they were many and troublesome, and caused an expenditure in time and money that had not been anticipated or estimated for. At the time of my visit the Kingsbury shaft was down 84 feet from surface and at this level a cross-cut had been put out east to intersect some veins of ore passed through in the shaft. At 9 feet from the shaft these veins were intercepted and driven upon in both directions, north 20 feet, and south 17 feet. There are three veins of plumbago here varying in width from 1 inch to 3 inches wide, on an average, with occasional spots up to 4 or 5 inches wide. These veins are in close proximity and in the northern drive they appear to the converging towards each other, and, should it by come together will, in all probability, develope one a highly productive vein of ore. More cannot be said on this point at the present stage of the exploration.

In the bottom of the Kingsbury shaft directly where sinking was temporarily discontinued, a very promising looking vein of plumbago was met with. This vein is from 3 to 4 inches wide of good quality ore and, I may say here, that all the veins

at this depth show plumbago of better quality than that to be seen in the 46 feet level of the old shaft.

This points to one of two things, either the veins discovered in the Kingsbury shaft carry better ore throughout than those met with in the old shaft, or that the quality of the mineral is improving in depth and I am of opinion it is the latter and that we shall find a corresponding improvement in quality in the veins coming down from the 46 feet level.

In addition to the drivages eastward of the Kingsbury shaft, before referred to, a cross-cut has been started west, and driven at the time of my visit about 5 feet, with the object of intercepting the two veins driven upon at the 46 feet level of the old shaft.

I should have preferred sinking the Kingsbury shaft another 20 or 30 feet before cross-cutting to those veins, as better results might be looked for at a deeper level, but this would take time and I am hoping that, at the level we are now we shall see an encouraging improvement in the veins referred to and therefore I instructed Mr. Hutchings to push on the driving of this cross-cut with all speed and I hope in a month, or less from this, to reach the point aimed at.

The chief object in sinking the Kingsbury shaft was to explore the veins discovered in the old shaft, at a deeper level and at better advantage than was obtainable at the old shaft. Thus will be seen the importance of continuing to a finish the cross-cut now started, and it will not be out of place here to say that unless this is done little will have been gained by the expenditure incurred up to the present.

As I said before I should like much to have gone deeper before tapping these veins, but the cross-cut now going in will show them some 30 feet deeper than where they were seen before and I am not without hope of seeing an improvement even at this depth and if my anticipations prove correct we may safely look for still better things as we go down.

I feel it my duty therefore to advise the carrying out of the explorations now in hand at the Kingsbury shaft as, with a comparatively small expenditure now you will attain the object sought namely prove, if the mine is likely be a profitable undertaking or not. So far, although the real object aimed at has not been attained the operations have not been without some good results.

New veins of ore have been discovered that, if not of very great value in themselves, show up the highly mineralized character of the district and point to an improvement in the quality of the ore the deeper you go. These facts are important in that when numerous small veins are met with it is usually inferred, and often proves to be true, that a large or mother vein exists somewhere in the near neighbourhood and I can see no reason why this may not be the case at Iddagoda.

Before closing I may say that your prospects of opening up a productive mine at Iddagoda have in no way lessened by recent operations. On the contrary I consider they have been enhanced by the discoveries made in the Kingsbury shaft and I have no hesitation in recommending a vigorous prosecution of the exploration of the mine.—I am, gentlemen, your obedient servant, LEONARD TREGAY.

Monerakande, February 25th, 1901.

THE HORREKELLEY ESTATE CO., LTD.

The Directors have pleasure in submitting the accounts of the Company for the year ending 31st December, 1900, shewing, after writing off R5,893·57 for depreciation on Buildings, Plant and Machinery, a profit of R25,104·77, which, with the balance of R563·03 brought forward from 1899, gives a total of R25,667·80 available for distribution.

The Directors recommend that a dividend at the rate of six per cent on the Capital of the Company be declared. This will absorb R24,000,—and leave a balance of R1,667·80 to be carried forward to 1901.

The working of the estate for the years 1898, 1899 and 1900 compares as follows:—

	1898.	1899.	1900.
Expenditure on Estate and in Colombo office	37,014·85	R36,754·67	R35,761·59
Number of Coconuts produced	1,437,885	1,305,429	1,502,298
Quantity of Coir Fibre made Ballots	35,474	28,324	22,592

Two Directors—Messrs. F W Bois and C E H Symons retire by rotation, and are eligible for re-election.

Tho Shareholders have to appoint an Auditor for 1901.

The current year's prospects are favourable.

ESTATES COMPANY OF UVA.

ACREAGE :

31st December, 1900.

	Tea in full bearing.	Tea in partial bearing.	Tea not in bearing.	Total Tea.	Other Products.	Timber, Grass, Forest and Waste Land.	Total.
Dammeria	515	60	29	604	30	556	1190
Battawatte and Forest Hill	413	178	...	591	..	164	755
Gampaha	455	78	57	590	45	231	866
	1383	316	86	1785	75	951	2811

The Directors have now to present to the shareholders the accounts of the Company for the past year.

The crops secured amounted to 667,101 lb. tea, 72½ bushels coffee, 167 lb. cardamoms and 41 cwt. cocoa. During the year 95,320 lb. tea were manufactured on Gampaha for other estates. The average nett price realised for the tea was 34·60 cents per lb., and 98·77 cents per lb. for cardamoms, whilst the cocoa realised about R46 per cwt.

After writing off for depreciation of buildings and machinery the sum R13,591·72, the nett profit for the year amounts to R34,720·26 equal to 4·88 per cent on the capital of the Company. To this has to be added the balance brought forward from 1899 of R13,090·04, less the sum of R409·17 over-estimated for tea unsold at the end of that year. There is therefore a sum of R47,401·13 available for distribution.

The Directors recommend the payment of a dividend of 4 per cent, that the sum of R10,000 be placed to credit of an Extension Fund Account, and that the balance amounting to R8,981·13 be carried forward to the current season's account.

During the year under review a sum of R21,228·97 has been spent under capital account, in instalment due on construction of the Battawate Road, additions to buildings and machinery, and upkeep of young tea.

The mortgage of R100,000 referred to in the 1898 report falling due, the Directors have paid this off, and negociated a fresh loan for £7,000 sterling on more advantageous terms.

The crops for the current year are estimated at 632,000 lb. tea, 25 bushels coffee, 60 cwt cocoa, and 150 lb. cardamoms on an expenditure of R183,855·35.

During the year Mr. G H Alston resigned his seat on the Board on his departure for England, and the Hon. Mr. W H Figg was appointed in his place. In terms of the Articles of Associa

tion Mr. F G A Lane now retires from the Directorate.

The appointment of an Auditor for the current year rests with the meeting.

CLYDE ESTATE COMPANY.

The report was as follows:—

Your Directors beg to submit their Report and Accounts for the year ending 31 December, 1900.

The quantity of tea made was: from Estate leaf 171,521 lb. and from bought leaf 13,610 lb. The yield for the year from tea in full bearing equals 385 lb. per acre.

The cost of tea, including transport but exclusive of manuring and other extraneous expenditure, was R42,457·26 or say 24·75 cents per lb. The net amount realised for the total crop (185,131 lb.) was R59,476·81, an average of 32·13 cents as compared with 35·73 cents per lb. in 1899.

All expenditure on the young tea has been charged against revenue. The cost of manuring during the year (R1,444·44) has been similarly dealt with. A sum of R7,418·33 has been set aside to meet doubtful debts, and the year's provision for depreciation in value of buildings and machinery amounts to R3,255·52. The available balance then remaining is R2,543·13, which the Directors recommend being carried forward.

Under the Articles of Association, Mr. E D Harrison retires from the Board, and being eligible offers himself for re-election.

The Shareholders have to appoint an Auditor for 1901.

UNION ESTATES COMPANY.

ANNUAL MEETING

ACREAGE.

	Tea in full bearing.	Tea not in bearing.	Cocoa.	Cardamons.	Total Cultivated.	Grass, jungle & Waste land.	Total.
Hayes Group	518	3	—	25	546	1,665	2,211
Dea Ella	248	—	91	—	339	147	486
	766	3	91	25	885	1,812	2,697

The Directors have now to present to the shareholders the accounts of the Company for the past year.

The tea crops secured were 87,416 lb. on Dea Ella (including 42,330 lb. purchased leaf) and 271,822 lb. on Hayes. The average nett prices realised were R31·44 cents per lb. for Dea Ella and R30·75 cents per lb. for Hayes, as against 36 cents and R38·65 cents respectively in 1899. The Dea Ella cocoa crop amounted to about 100 cwts., which sold at an average of R44·30 per cwt., and the Hayes cardamom crop sold realised R1·21 per lb. nett.

The plant for the electrical transmission of power to the factory on Hayes estate continues to work most satisfactorily.

After making provision for the depreciation of buildings and machinery, writing off a sum of R180·82 cents for irrecoverable coast advances and allowing for the balance of R1,818·86 cents brought forward from 1899 account, the result of the year's working shews a loss of R6,286·26 cents to be carried forward to the current year's account.

The Directors deeply regret this disappointing result which is entirely attributable to the extremely low prices ruling during the year for teas of the description manufactured by the Company's estates. Under the circumstances the Directors and Agents have decided to refund half their fees for the year.

The amount expended upon capital account during 1900 was R13,256·68 cents for instalment due on the construction of Hayes Cart Road, additions to buidings and machinery on Hayes, and upkeep of tea and cocoa on Dea Ella not yet in bearing.

The estimate for this year is 359,250 lb. tea, 120 cwts. cocoa, 12,000 coconuts and 600 lb. cardamoms, on an expenditure of R104,998·60 cents which includes R1,310 on capital account to be expended on upkeep of cocoa clearings on Dea Ella and the planting up of a further 10 acres in cardamoms on Hayes.

In term of the articles of Association the Hon. Mr. W H Figg now retires from the Board, but is eligible for re-election.

The appointment of an Auditor for the current year rests with the meeting.

HIGHEST PRICE FOR CINCHONA SEED.

We are indebted to Mr. Standen, Director of the Government Cinchona Plantation, Nilgiris, for the following memorandum:—

"From the Report of the Director of the Dutch Government Cinchona Plantations for the quarter ending 31st December, 1900, I see that the highest price paid for a packet of 25 grammes of cinchona seed was 555 guilders or 22·2 guilders per gramme. This is equivalent to 10069·69 guilders or R12,587 per pound."

AN EXPERIMENT IN PISCICULTURE.

A recent number of the *Fishing Gazette* contains an interesting account, by Captain Stuart Godfrey, of the attempts made by a small body of enthusiastic anglers to introduce the English trout into Kashmir waters. We briefly chronicled the failure of the initatory endeavour in this direction, the misadventure being due to the carelessness of the agents entrusted with the sending out of the trout ova. But, though disappointed, the promoters have not been disheartened, and we shall hope to hear very shortly of the success of their second experiment. Meanwhile it is worth while glancing at the history of this attempt to improve the sporting qualities of the waters of Kashmir. Experience has proved that trout ova could be successfully conveyed to South Africa, New Zealand, and elsewhere; and there seemed no reason, says Captain Godfrey, why, despite the long road journey from Rawalpindi to Srinagar, the ova should not during the cold season, be brought out by a line steamer to Bombay or Karachi, and thence conveyed to Rawalpindi and Srinagar. Colonel Unwin headed the subscription list which was started for this purpose, and support was also forthcoming from a few others interested in Kashmir. The State authorities approved of the scheme and promised certain assistance, such as a site for the breeding shed, a supply of water, and the setting aside if necessary of a portion of the Dal or some other lake for the purpose of the experiment. The Duke of Bedford also kindly offered a present of 10,000 ova to start the proceedings. Elaborate arrangements had been made in India for the reception of the ova. A railway carriage was sent to the Karachi docks with slings fitted in it to support the ova box. Ice had been got ready for the train journey, and

every possible precaution taken to ensure the safe transit of the future trout from the seaboard to Rawalpindi. Meanwhile, for the road portion of the journey, Mr Dhahjhidboy had prepared a special torga, and arrangements had been made with the tehsildars all along the road to Kashmir for an ample supply of ice and snow at each halting station. The Collector of Customs, too, at Karachi had also promised to see that there was no delay in clearing the eggs. All these careful preparations were unfortunately rendered useless by the action of the home forwarding agent who actually sent out the ova in a slow steamer, unprovided either with ice or a cool room, so that there was nothing to take over at Karachi but a mass of putrid eggs. The Duke of Bedford, however, has again come forward with a fresh present of ova, which reached Bombay a few weeks since in the *Caledonia*, but regarding the arrival of which in Kashmir we are at present without any information. Pending the receipt of this, however, it may be of interest to consider the chances of successfully acclimatising English or American trout in the lakes and rivers of the Himalaya.

Captain Godfrey thinks that there is every chance of success. He points out that those interested in the present venture have several important points in their favour. These are: (1) water supplied in pipes from a glacier-fed stream filtered in the reservoir; (2) ice and snow within easy reach costing even in summer only two days' coolie wage for a man's load; (3) a community of sportsmen always in the country, from whom assistance may be relied on; (4) a temperate climate little dissimilar to that of Switzerland or Scotland, except for a short hot weather; and (5) the assistance of the Kashmir State officials. There is a good deal no doubt in this list of advantages, but yet the Kashmir Fishing Club would do well not to be too confident. Success in matters of this kind is not to be expected at the outset. We say this, not for the purpose of throwing cold water on the scheme, but rather with a view to encouraging those interested to persevere in their attempts even though they be met at the outset with many unmitigated failures. It was only after numerous failures that the English trout was at length successfully acclimatised in places such as New Zealand and Tasmania. In the Nilgiri Hills, too, there have been many endeavours to introduce the English trout, but so far with practically no real success. A careful examination of all the various ponds and streams in that district wherein trout have been from time to time deposited, lately revealed their almost complete absence. A few unhealthy-looking fish were, it is true to be found, the sole remnant of the thousands imported. But there had been apparently no attempt on the part of these to perpetuate their species, and the Nilgiri attempts, so far as our information goes, must be written down a failure. It remains to be seen what will happen in Kashmir. It would be difficult to exaggerate the nature and extent of the many obstacles to be overcome before trout can be successfully acclimatised. Kashmir presents certain solid advantages for an attempt of this nature but the list of these as presented by Captain Godfrey does not necessarily ensure success. We will assume, for instance, that the ova are landed in Kashmir in a healthy condition, that is, with the usual percentage of bad or unfruitful eggs. This is no small assumption by the way. The next thing to do is to hatch out the eggs. Here undoubtedly the supply of pure cold water mentioned by Captain Godfrey will come in useful. Such a supply is the very first desideratum in trout culture. If all goes well the fish in due course are hatched out. For a certain period after their entry into this world they feed on the contents of the umbilical sac with which nature provides them. There soon comes a time, however, when this source is pretty nearly exhausted and it is necessary for the young fry to obtain other food. The glacier water will certainly contain no food, so that recourse must be had to other means. Artificial feeding is seldom satisfactory, and the difficulties in carrying it out would be enormously increased in the case of a country like Kashmir, especially as there is no skilled professional pisciculturist on the spot. It will be necessary therefore to fall back on the natural food present in minute particles in the water of the lake or some neighbouring stream which runs, not through a rocky channel, but through weeds. There ought to be plenty of such water available for the Kashmir experiments, and no doubt there will be plenty of food in it. The question which remains to be settled, however, is whether such food will be suitable and acceptable to English trout fry. If it is, well and good. The experiment will have advanced to a notable extent, and barring accidents, the young trout will soon grow to a respectable size. Here the temptation to turn the trout at large may be felt, but it is to be hoped will be strenuously resisted. Turning them out at such an early stage would simply mean that they would never be seen again. The Kashmir lakes and rivers swarm with the so-called Kashmir trout, a fish of the most pronounced cannibal tendencies, and running to over twenty pounds in weight. These fish would certainly soon make short work of such interesting strangers as yearling English trout. Even if thousands of two-year-old trout were turned out into unenclosed Kashmir waters, it is doubtful if any of them would be met with again. The extent of water is enormous, and the cannibal instincts of the native fish, together with the inroads of the mahseer during the summer months, would easily account for their early disappearance. No; the only way to go to work with any chance of success is to get out from England relays of ova. These must be hatched out in succession and kept in separate partitions until a respectable size. They could then be turned out into a carefully partitioned-off part of, say, the Dal lake, care being taken that only fish much of the same size were placed in the same position in order to prevent cannibalism. These partitioned-off spaces of natural water could be gradually enlarged as the trout grew larger. In time the fish might begin to breed, and then the success of the experiment would be assured. The management would be able to secure as many ova as they required on the spot, without having to go through the risky and expensive operation of importing them from Europe. It would then be possible to turn out from time to time some of the larger fish into open waters, and as the hatching and breeding operations would be kept up and more and more fish turned out into the open, a time would eventually arrive when it would be possible to truthfully assert that the English trout had at length been thoroughly acclimatised in India.

Exactly what this would mean, it would be difficult to exaggerate. The attractions of Kash-

mir as a holiday resort would be doubled, and it might be quite possible to extend the Indian habitat of the trout to such streams as the Poonch and the Giri. Generally speaking the fish could only be introduced into the Himalayan streams, for in waters whose temperature rises for considerable periods over 60 degrees Fahrenheit, the salmon family do not thrive. Still the success of one serious attempt at pisciculture might give rise to others. Why not try and cultivate the mahseer, for instance? There are not wanting signs that this truly sporting fish, what with the enormous increase of poaching and the greatly extended operations of anglers, will in time begin to get scarce in many of the more get-at-able waters. What has already happened to the salmon in many home streams will in course of time happen also to the mahseer, unless Art steps into assist the operations of Nature. When once a certain amount of practical experience has been gained by Indian sportsmen in the art of fish-rearing as carried out in Kashmir, it would be a comparatively cheap and simple matter to rear young mahseer in suitable localities, and thus add enormously to the sporting value of the selected rivers. The experiment now being carried out in Kashmir is consequently one which is capable of great results, and the progress of the operations will be watched with anxiety by all who take an interest in the improvement of sport. So far the cost of the Kashmir trials has been borne by a few, but we feel confident that if experiments on a small scale give any promise of success, there will be money enough forthcoming from the sporting community to enable them to be prosecuted on a more ambitious scale.—*Pioneer*, February 8.

A TROPICAL BEAT FOR BLACK BEAR IN KASHMIR.

All the arrrangements had heen made the day before by "Whiskers," my *shikari* (so-called because his hirsute appendages stuck out like a cat's), for 50 coolies and 3 tom-tomwallahs to turn up at 6 a.m., which means 8 a.m. Consequently when they arrived talking only as Kashmiris can talk at 9 a.m., it did not matter much, as it is considered rude to disturb a bear in his early morning sleep. As a matter of fact, it is easier to drive them in the middle of the day when it is hot. Off we started —Kashmiris, tom-tomwallahs, hangers-on and swells, *tous ensemble*—to a narrow strip of forest on a steep side of a hill about one mile away. The coolies and tom-tomwallahs, &c., were distributed, according to the drive, at either end of the forest, to beat both ways and eventually meet in the middle. In the meantime after a stiffish climb myself and *shikari*, who was fairly agog with excitement, reached the top and planted ourselves, after much deliberation on my *shikari's* part, by a boundary pillar with a view down either side, along the ridge, for about 100 yards along a cut line, with perfectly dead ground at my feet. This I tried to explain would be very awkward with a lively bear. However, there was no time to change now as the faint sound of tom-toming was heard in the distance. All the rifles and guns were loaded and I tried to get comfortable; but deodar needles are not the best of friends with thin trousers. On came the beat with the coolies whistling and shouting, all making as much noise as an English school-boy does when he gets a half-holiday. Suddenly—"What's that?" from my *shikari*, accompanied by a nudge in my short ribs, as a breaking of branches was heard below us to the left. I grasped my faithful ·500 and waited; the noise came nearer, and then I saw something black. "Shoot, shoot," cried the *shikari*, "Baloo, Baloo"; but I was not such a fool as to do so until I had seen what it was; for to shoot a cow in Kashmir is considered much worse than polishing off a human being; and right enough, after about three minutes, out wandered a small black heifer across the cut line. My *shikari* was quite overcome, wagging his head and clasping his hands and muttering prayers to *Allah* in his whiskers. But there was no time for this, so I woke him up with the butt-end of my rifle. In the meantime the beat had been drawing nearer and nearer, and the whistles sounded like a lot of gallery boys in a theatre on the Surrey side of the river. Suddenly another nudge from my *shikari*, and right enough, in the bushes to my left, about 100 yards away, below the cut line, I saw something move. I turned round and got into as comfortable a position as I could when out bolted a bear across the line. Bang! I let drive, and what a row he kicked up, which was good to hear as I knew I had hit him as he disappeared down the other side of the hill. The *shikari* was simply bursting with joy, so I had to quiet him again with the butt-end of my rifle. The beat now was coming to an end, and the *shikari* was thinking of stopping it, when suddenly—"Wough-wough," and a grunt at my feet; of course, just where nobody was looking; and out of a bush from this very dead ground appeared the sleek head of a fine black bear. I don't know who was the most surprised—the bear, the *shikari*, or myself. Anyhow the bear bolted before I had time to swing round on deodar needles (a very painful performance) and get a shot. The brute evidently broke back through the beaters as he never appeared again. This made old "Whiskers" very wroth, and so he hurled invectives at all the coolies' and tom-tomwallahs' grandmothers as they turned up, in which performance the poor man made himself quite hoarse.

The beat being over, great excitement was evident amongst the coolies, especially as my *shikari* had informed them that the bear I had shot was at least 12 feet long. The next business was to track up the wounded bear; and for this purpose village dogs were sent for. These amused themselves for the first half hour in pulling each other to pieces, and judging from the fur that flew, they did. However, with the help of many sticks, they were brought under subjection. In the meantime my gallant *shikari* had disappeared, taking with him, without my knowledge, my 12-bore loaded with ball. Suddenly, bang-bang, far down the hill. I collared my rifle and legged it for all I was worth to where the sounds came from, through thick brushwood, which was almost as nasty as the deodar needles. I came upon my trembling *shikari*; probably he was in a funk on account of his having disobeyed orders in shooting, and not from being alone in the proximity of a wounded bear. He informed me that he suddenly came across the bear lying down, and that he let him have it, right and left, straight into the brute's back. This evidently woke him up, as he had gone down hill; but the dogs soon rounded him up: so I took the 12-bore and descended to where the dogs were baiting the bear behind a large deodar tree. I could see nothing, so sat down about 20 yards away above the tree and awaited results. Presently a black head appeared round the corner, so I gave the beast a ball in his neck which settled him. The plucky dogs, finding the bear dead, immediately began to maul the carcass and to pull it down the very steep hill side. However, the coolies soon drove them off, and when in about an hour's time 10 coolies came staggering under the load, I had him measured—a full 4 feet ten inches. So much for the 12-footer. I found that my first shot had hit him a few inches behind the shoulder and had torn him about terribly. The *shikari's* shots had further blown great holes into him; and it was a wonder, the animal being so small, that he ever got away at all—a fact which shows their extreme vitality. I had two or three more beats after this with no luck; but as moral: "Keep an eye on the *shikari*."—*Indian Forester*. E. RADCLIFFE.

RUBBER COLLECTION AND CULTIVATION.

The various reports coming from our consuls and agents in different parts of the world contain a large amount of very interesting matter respecting the collection and cultivation of rubber in the various parts of the world where this useful article can be obtained. Considerable attention has been paid to the subject, with the result that the rubber has arrived on the market in a very much better condition and more suitable for manufacture than previously. Where the work has been left to natives, their only idea being to get as much as they can for their work on the spot, they have not troubled much about the future, the consequence of which was that they loaded the raw material with all kinds of sand, stones and rubbish, so as to make their parcels of rubber heavier and so obtain a larger remuneration. Rubber collected in this way has given a vast amount of trouble to india-rubber manufacturers, who have been compelled to inspect every piece of rubber very carefully before putting it into their machines, otherwise great damage might have been done to them. Another difficulty was with regard to the condition in which the rubber arrived upon this market; being badly prepared, it had deteriorated very considerably by the time it reached the rubber manufacturer, and, consequently, the loss in washing and drying was very considerable, but now that the requirements of the Trade have been more generally known, especially in the foreign countries and our own colonies, the result is that the rubber comes to the market in a much cleaner condition than it used to. Owing, however, to the more speedy means of transit, the rubber, as it now arrives, contains more moisture than it originally did, when it took some months to get from the point of collection to the port of shipment, and some months to the English ports. Now, owing to our ocean greyhounds, the rubber can be brought from far up the country to the English manufacturer in the space of a very few weeks. Manufacturers must not, however, be led away by the clean appearance of the rubber and should allow for the additional moisture which it contains. It is all very well to take the average of past years as a basis, but we hear on all sides from manufacturers that the loss on washing and drying raw rubbers keeps on increasing every year, in spite of the improvements which have been made in the condition of the rubber. Experiments are being continually made to find out the best means of curing, and we suppose that it will not be many years before some satisfactory method is adopted whereby rubber can be bought on the English market, which is practically pure and ready for immediate working without the usual process of washing and drying. The past century has seen vast improvements in the Rubber Trade, but we anticipate that in the early years of the present century much more will be known about this useful material, and considerable strides will be made in the collection of the raw material, especially in those districts where the cultivation has been carried on upon proper lines. There are various processes of coagulation which have been tried, but none seems to have answered so well as the old-fashioned process of smoking carried on in Brazil; but, still, time will prove.—*India-Rubber Journal*, Jan. 21.

RUBBER PLANTING IN BRAZIL.

An interesting account of rubber planting reaches us from Brazil. The centre of the rubber plantations in the State of Minas is Bagagem where at least 150,000 shoots have been planted during the last two years. On one plantation the trees had already reached the height of 5 metres (16 feet 3 inches) some of them of little more than a year's growth. The trunks, however, have not developed in proportion and only measure, so far about 20 to 30 centimetres (10 inches to 12 inches). This plantation is situated on high gravelly soil and counts some 10,000 trees. The older trees planted two or three years ago show signs of abundant latex, which exudes from the tender shoots and solidifies the stems. The growth of the trees was greatly retarded in the winter months, from June to August, but afterwards the development was surprising, nearly 3ft in three months. The trees were raised from seeds planted three together, the holes being at distances of 12 to 15 hands from one another in regular lines. Only one weeding is necessary per annum. The climate of Minnas is cold, falling below freezing point in some localities during the winter, and as Manicoba appears to be peculiarly susceptible to cold, it is necessary to choose the ground carefully. Within a few years the Manicoba industry may be expected to give important results.—*India rubber Journal*, February 4.

TWO NEW PLANTING DISTRICTS.

We have now decided to separate from the Kurunegala district, the following estates to be included in a

GALAGEDARA DISTRICT,

namely :—Aluta, Betworth (late Isabel), Dea Ella, Greenwood, Malgré Moi, Mousava, Morankande, Nella-Oola, Rockhill, Sunnyside, all of which are served by the Post Office at Galagedara, to which will be added Belgodde (P.O. Rambukkana) and Moorock, Muttettudeniya, Rookgolle and Woodslee (P. O. Weuda); as well as Bollagalla Upper and Lower, with Kandy as post station. We may as well also transfer a number of places which have "Madawalatenne" as post station, though most of these are now "uncultivated": — Ancumbura,, Battagolla, Beragama (Peradeniya), Boccawella, Bon Accord, Dunira Fulton's, Tennekoon's and Wilson's Land, Galanne, Goddehena, Hatbawa, Hingulgalla, Iddegodde, Kallugallatenne (Kandy), Kandewatte (Peradeniya), Mahatenne (Kandy), Palagalla (Peradeniya), Richgrove (Kandy), Riverside, St. Julia, Thornhill and Wattagalla) (Kandy). Any proprietor or manager who objects to such transfer, or any one wishing to include a further estate, will kindly communicate with this office at once.

Then we are urged to establish a

SOUTH MATALE DISTRICT,

as we have Matale North, West and East; and Mr. H. Storey is good enough to suggest the following estates for this new district:--Benveula, Ballacadua, Barton, Duncrub, Goruluhela, Kaduwella, Kotuwagedera, Kuruwille, Marakona, Malvern, Meegastenne, Muwagala, Pansalatenne, Ratwatte, Syston, The Grove, Ukuwella, Vellana, Warriapolla, Warakamure, Wyamita—21 estates all described as truly of "Matale South," taking the town of Matale as a centre. Here again we are in the hands of proprietors and managers. If any object to this proposal, or wish to modify it in any way, let them write at once.

TEA "REFUSE" AND CAFFEINE; ALSO CINCHONA PROSPECTS.

Mr. F. L. Seely,—the very worthy and well-informed representative of a big American drug house—has been giving us some useful information about tea refuse and caffeine. Mr. Seely is chiefly interested in cinchona and quinine, and he tells us plainly that Java commands—and must for many years command—the "bark" market with her 25,000 acres of old trees, chiefly Calisaya, which, if the price justified the export, could supply five or six million lb. in place of the normal one million lb, of bark, each month. Last year Java supplied 12,000,000 lb. of cinchona bark and manufactured one-tenth (one million ounces) of the world's supply of quinine. There is, therefore, no special encouragement to grow cinchona in Ceylon, save as an adjunct to other products; and in this direction, a good deal may be safely done, because the Java planters are bound to keep up the price for their own protection. Mr. Seely ran up to Kandy, Hatton and Blair Athol; but finding it took him four hours to find as many cinchona trees (!), he thought he had better hurry over to India.

But now to turn to refuse tea and caffeine, Mr. Seely estimates that the world's requirements in caffeine equal 50,000 lb. at least and may shortly rise to 100,000 lb. To produce this quantity, chemists require from five to ten million lb. of refuse tea. The firm of Messrs. Bohringer, as representing the great Mannheim Chemical Manufactory, have hitherto been the chief purchasers of such refuse; but they find a difficulty in dealing with planters, because of their fear lest any of the tea should be sold for food consumption. Of course, such an idea is absurd in the case of a house of the standing of Messrs. Bohringer. But Mr. Seely suggests a very easy check. The addition of some lime to refuse tea would prevent its use for food consumption, while it would aid, even expedite, the work of the chemist. If, therefore, the planters consigned their refuse tea to Messrs. Bohringer's store in Colombo, a representative of the Planters' Association or "Thirty Committee" could, once a month or once a quarter, check the consignments and see the lime duly added. We give this suggestion for what it is worth. Certainly the transfer of some 5,000,000 lb. of refuse or rubbishy teas to the chemist ought to be an object worthy of attention from the Association and Chamber's Committees.

COCOA AND CHOCOLATE:

THE NEW LOCAL INDUSTRY.

(*Communicated.*)

Of late years, manufacturers in some parts of the world have complacently claimed the credit to themselves of giving to the consumer an article of diet of great excellence, as if the excellence was not in the bean itself before it went into the manufacturer's hands. Long before the days of elaborate machinery and the necessity for laws against adulteration of foodstuffs the Mexican ground his cocoa paste in the primitive grindstone of the aborigine; and in golden goblets, we are told, did the kings sip this ambrosia of the gods. If, therefore, the manufacturer could take credit for aught he could of a verity only claim credit for leaving well alone. To him, indeed, could a discriminating public say in these days of popularised science—for he can take away much of the purity and strength of cocoa with the aid of starch, as he could increase its solubility by the addition of deleterious chemicals:—"Nothing extenuate, put down nought in malice." The medical faculty may, in the case of those with a weak digestion, demand a reduction of the natural fat found in the cocoa. But this is readily extracted by the use of a press, while the cocoa is still in a liquid state, as it flows out of the mill, and the confectioner as readily takes it away at double the price paid for the nib. The residuum is what the manufacturer is pleased to call essence! Such is the romance which attaches to cocoa.

OUR VIEW OF BARK AND A BROKER'S.

Readers who have followed our articles on cinchona and quinine during the last three years will be especially interested in a letter recently issued by Messrs. Woodhonse & Co., the well-known bark brokers. There is nothing remarkable in the fact that this firm interprets the figures relating to cinchona as we do, for it is difficult to see how anyone taking a wide survey of the situation can come to any other conclusion. The only people who doubt the evident conclusion are those who expect that if the natural position of an article is strong the article should stand any amount of rushing by speculators without having reactions. Messrs. Woodhouse's way, however, of putting certain points are, perhaps, curiously like ours. As the letter is lengthy, we can only, of course, refer here to scattered passages.

First, the fact is noted that 1900 is memorable as being the first for many years in which the value of the unit in bark did not fall below 1d per pound, and the price of quinine below 1s per ounce. The average units for bark were, for 1900, 10.13 cents in Holland and 2d in London, as against 7.05 cents and 1⅜d in 1899, and 4.78 cents and 15-16d in 1898. One noteworthy point to which we drew attention is here emphasised—viz., that whereas in 1899, at the point when the unit reached 10.90 cents, manufacturers raised quinine to 1s 9d, in 1900 the alkaloid was never above 1s 7d, though 12.25 cents was the unit in September. A calculation is also made, showing cost of quinine in bark, this cost plus that of manufacturing, and the selling price. Taken in the order named these factors are:—1900, 1s, 1s 4d, 1s 5½d; 1899, 8d, 1s, 1s 3d; 1898, 5½d, 9½d, 11d. This reveals at once how the general trend of bark and quinine has been strongly upwards, and how a healthier situation is being promoted by the closer approach of cost and selling price. In the broker's letter the cost of manufacture is put at 4d per oz; we think 3d is a fairer figure.

Turning to the question of consumption and production, some carefully compiled tables are given, which, however, we will leave for later consideration. At present we may simply say that the conclusion from these is the one we have repeated again and again, viz, that consumption has overtaken production. In these tables the production is probably stated rather too low; indeed, alkaloids other than quinine

sulphate are purposely excluded. The figures given for the last three years, set out as ounces of quinine, are as follows:

	1900.	1899.	1898.
Production ...	12,261,000	12,447,000	12,855,000
Consumption ...	14,818,000	14,861,000	14,464,000

Thus we have been drawing on stocks of bark, that in London having fallen from nearly 20,000 packages to less than 10,000. Allowing for the in crease in stocks of quinine, the net reduction in the last year of bark and quinine stocks is given as 1,213,000 oz of the latter.

Moreover, Java bark has been falling off in quality as well as quantity. In 1897, 5,315,000 kilos offered gave 10,256,000 ounces of quinine; in 1900, 5,260.000 kilos only gave 8,735,000 ounces. About 900,000 ounces of quinine have been sold in Java during 1900. This manufacture locally has undoubtedly had the marked influence, as stated, of forcing European makers to maintain a good unit for bark and a low price for quinine. Java planters have thus the matter in their own hands (irrespective of financial obligations) and, if they behave sensibly, we ought to see higher prices still this year.—*British and Colonial Druggist*, Feb. 15.

THE WORLD'S SUPPLY OF CRUDE RUBBER.

NO CHANCE OF A MONOPOLY.

There is no real scarcity of rubber. Vast supplies exist in forests which have never yet been "worked," and there is rubber in warehouses in many markets, and afloat on the seas, for all who have the money to pay for it. Every country that ever yielded any rubber continues to do so; every grade of rubber that ever came to market is still coming; the world's total production, as rule, becomes greater every year. All who have use for rubber goods of any sort find the market amply supplied. Where, then, is the scarcity? It is true that, now and then, consumption gains on the rate of production of the raw material, and prices may rise in consequence, but this very fact starts more gatherers to work, and prices tend downward again. Of course all crude rubber costs more than formerly, but this is true of many other things, and consumers now are as able to pay for the rubber goods they need as people ever were.

No fear need be felt that the supply of rubber will ever be monopolised. Could such a thing be done, the manufacturer, first, and the consumer of rubber goods, in the end, might be made to suffer exactions hard to bear. But a consolidation of all the firms, in various parts of the world, who have capital invested in handling crude rubber, would be out of the question, if only for the reason that the rubber business is as a rule carried on in connection with other trading, from which it would be difficult to separate it. A complete monopoly of rubber, then, would mean a great general trading company constantly liable to competition from new sources, in respect not only to rubber but to all the other commodities. The success of the Standard Oil Co., a notable example of monopoly, is due to their complete control of the natural supplies, confined to a limited and accessible territory, and to handling their products on a very large scale, making great economies possible. Rubber, on the other hand, is obtained throughout a wide belt, extending around the world, but mostly in regions remote from civilised centres, unsuited for white men; it comes in driblets to innumerable initial markets, from millions of gatherers, whose labor practically is beyond control. Moreover, if all the forests now yielding rubber, and all the rubber gatherers at work, and all the houses trading in rubber in America, Europe, Asia, and Africa, were brought under a single control, the possibility would exist of new forests being explored, new workers found, and new trading houses opened, every one of which facts would tend to the overthrow of the monopoly.

As for the future of rubber prices, certain considerations are worthy of attention. In the first place, the great increase in the demand for raw material in recent years has been due both to new uses of rubber, and to the introduction of the use of rubber goods into new fields. In not a few cases the recent rate of growth doubtless is meeting a check for the present, whereas the production of rubber seems likely to continue, in which event it would seem that prices should decline. On the other hand, a very marked decline in prices would lead to still further new uses of rubber, which would prevent the cost from sinking to former levels, or at least from staying there very long. In this connection may be mentioned the widespread interest in planting rubber, the outcome of which can hardly fail to be, within ten or twenty years, a considerable addition to the world's supply of this commodity, which will further enable its use to be extended.

The constant fluctuations in the price of rubber are most inconvenient at times for manufacturers, especially where contracts are made for supplying goods at a certain price, which price may fail to yield a profit on account of a heavy and unexpected advance in the cost of the raw material. Here is involved, by the way, the whole question of speculation in rubber prices by manufacturers, to which a further article will be devoted in a latter issue. But manufacturers have it in their power, to a certain extent, to protect themselves against some of the unpleasant effects of fluctuations in prices by keeping on hand larger stocks of rubber instead of the "hand to mouth" policy of buying that so many of them pursue.—*India Rubber World*, Feb. 1.

TEA PLANTING IN JAVA.

PAYING WELL: BUT EXTENSIONS NOT PUSHED!

Tea-growing pays so well in Java that the area under the staple shows increase. Yet capitalists, as a rule, shrink from investing money in this line of enterprise. The Batavia *Nieuwsblad* deplores this lack of interest at the present time, when coffee is on the down grade and when, owing to the abandonment of many coffee estates, thousands of labourers thrown out of employment can be started on tea-planting. Investors object that tea-growing stands under the disadvantage of no dividends being available in the early years of an estate. The reply is that this is made good by the heavy dividends sure to come once the estate has begun to bear.—*Straits Times*, Feb. 25.

FIBRE PRODUCTION BY INDIGO PLANTERS.—The cultivation of fibre-producing plants has lately been taken up rather extensively in India, particularly in the indigo districts; and there would appear to be every promise of satisfactory returns being obtained by the planters. A sample of agave fibre, decorticated by Faure's machine, recently sent home, has been valued at £24 a ton, which should make its production a fairly profitable one to the grower.—*Englishman.*

ROYAL BOTANIC GARDENS, PERADENIYA.

The Director and his Staff, aided by the Government Printer, deserve great credit for the promptitude with which their interesting and valuable Reports for 1900 have seen the light. We hope through the courteous aid of the same indispensable Printer, to give our readers the advantage of reading the bulk of the Reports in the very convenient and reliable form in which they are officially issued. And meantime we can only say that it is evident the Staff —Director and Botanist, Mycologist, Entomologist, Consulting Chemist and temporary Assistant, besides the Curator at Peradeniya and the Superintendent at Hakgalla are now in full working order, and that much good should result. "The losses by disease are enormous and to save even 5 per cent of them," it is rightly said, would be "a great gain." Camphor, citronella, tobacco and sericulture are new or minor industries to be investigated. The total cost of the Department for 1900 was R71,740 against R58,822 in 1899; the receipts from sales fell off owing to lower price of rubber seed and aggregated last year R4,659. The paragraph of most general interest and importance at this time is that on our staple from Mr. Willis:—

As the extension of cultivation, though practically over in Ceylon, is still going on in South India, Java, and elsewhere, it is probable that the full effect of over-production has yet to be felt, and that the tea industry has now to pass through a trying period, which may lead to considerable alterations and reorganisations in methods of working, &c. Greater specialisation, larger factories under specially-trained managers, manuring and plucking for quality rather than for quantity, selection of the best and most suitable jâts as regards quality of tea and power of resisting disease, replacement of inferior bushes and fields by better and by other products, careful precautions against disease, and improvements in methods of cultivation and manufacture, are some of the directions in which relief may be looked for. Tea has been comparatively free from serious outbreaks of blights during the year (see supplements). A commencement, which may lead to important developments, has been made in the manufacture of green teas suited to the American markets. If this extend, it will temporarily relieve the overproduction difficulty.

Mr. Carruthers deals with Cacao and also with Tea Blights; while the list of "enemies" dealt with or described by Mr. Green is very formidable; but it shews how keenly he is on the alert. Mr. Macmillan and Mr. Nock also supply interesting reports; but we must close for the present with the Director's notable reference to Trimen's "Flora of Ceylon":—

The fifth and last volume of the Flora of Ceylon appeared early in the year, written by the veteran botanist, Sir J D Hooker. The Colony now possesses perhaps the best existing Colonial Flora. At the same time, this flora is anything but complete; there are yet many new species to be discovered, and many occur in other localities than those mentioned. For the filling up of the gap we must rely largely on the help of local botanists and an attempt will shortly be made to interest more of the public than have hitherto cared for such things in the study of this most fascinating of the sciences. Suggestions to this end will be cordially welcomed.

MINOR PRODUCTS REPORT.

London, Feb. 14.

Coca Leaves.—Offered, 32 packages. Sold 0. Ceylon leaves of the Huanoco character were bought in at 1s 6d, and broken Truxillo leaves at 1s 2d.

Cinchona Bark.—The London bark auctions for February were held this week. The offerings and sales were rather lower than at the last auction. Out of 1,343 packages offered, 1,132 were sold. The weight offered was 285,394 lb, of which 230,549 lb were sold. The unit was 1½d. The following prices were paid:—Calisaya, cultivated Bolivia quills were sold at 7½d to 8⅝d. Ledger, Java chips were sold at 3d to 4⅜d; branch, at ⅞d. East India chips were sold at 4⅞d to 4⅛d. Officinalis, East Indian chips were sold at 2½d to 8d. Ceylon, branch, 2½d; hybrid stems chips, 3¼d. Succirubra: Ceylon chips sold at 2⅜d to 4d; and roots 4d to 4⅝d; Hybrid chips at 3⅜d.—*British and Colonial Druggist,*

RUBBER IN MEXICO.

The British Commercial Agent in the United States has sent the following report upon the development of the rubber industry in Mexico by American capital:—

The report states that out of the interest in the subject of planting rubber in Mexico has grown a series of companies operating in the Ubero district on the Isthmus of Tehuantepec, whose prospects seem encouraging. Two companies have existed for some time past having their headquarters at Indianopolis. These are the Mexican Coffee & Rubber Company, and the Ubero Plantation Company, of Indianopolis.

The Ubero Plantation Company was incorporated under the laws of Maine, August 10th, 1900, with 1,000,000 dollars capital. The company owns 3,000 acres, adjoining the original Ubero tract, on which it proposes planting 1,000,000 coffee trees, 400,000 rubber trees, and 1,000,000 pineapple plants.

The Isthmus Rubber Company of Ubero, now being organised, will have a New Jersey charter and its principal offices in New York.

Tehuantepec Rubber Culture Company, Canton Mintitlan, State of Vera Cruz, Mexico.—The personnel of this company were all in the organisation of the Woolson Spice Company. The original stock of the Woolson Company was 37,500 dollars; it paid in dividends in six years over 1,000'000 dollars, and the company was then sold for 2,200,000 dollars. The Dos Rios plantation has also been a marked success.

Mexican Plantation Company, State of Vera Cruz, Mexico.—This comnpany was incorporated under the laws of Indiana on November 20th, 1900, with 10,000 dollars capital, fully paid. It has acquired 600 acres on the Tesechoacon River, 90 miles from the gulf port of Alvarado, and purpose planting 125,000 rubber trees in the spring.

La Zacualpa Rubber Plantation Company, State of Chiapa, Mexico.—A report recently issued by this company states that during the last year 600,000 rubber trees were transplanted, 1,000,000 rubber plants were placed in nurseries for transplanting in 1901, 1,000,000 plants were started in seed-beds for transplanting to the nursery.

The Leavenworth Coffee & Rubber Company, Leaven worth, Kansas, is mentioned as having a tract of 2,000 acres just above the Dos Rios plantation, on the Isthmus of Hehuantepec. Some coffee, rubber, and vanilla have been planted.—*India-Rubber Trades' Journal,* Feb. 4.

AVERAGES FOR TEA SALE.

FEBRUARY 27TH, 1901.

[From Messrs. Forbes & Walker's Circular]

Estate	Total Quantity	Average Price.	Estate	Total Quantity.	Average Price.
Adisham	35p	42	Kuruwathai	38c	28
Agra Oya	54c	25	Labuduwa	14c	19
Agra Ouvah	143p	47	Little Valley	60c	24
Ahamad	24c	15	M.	114p	22
Amupitiya	18c	20	Maha Uva	53p	32
Annandale	88½c	48	Maldenia	69p	24
Ardlaw & Wishford	58p	41	Marlborough	245p	41
Avisawella	65c	23	Mawiligangawatte	93c	43
Battalgalla	58c	38	Middleton	77p	45
Battawatte	54c	24	Morah la	54c	26
Ben Nevis	61p	45	Nahaviila	67c	37
Bittacy	61p	40	Ninfield	61c	21
Brownlow	72p	38	Nugawella	47c	24
Carberry	64c	24	Oakham	77p	39
Castlereagh	69c	38	Old Meddegama	75c	30
Citrus	57c	16	Oodoowera	12c	39
Clyde	201c	22	Oonoogaloya	61c	43
Cold Stream Group	170p	37	Penrhos	69p	39
Corfu	110½c	32	Pine Hill	119p	39
Damblagolla	90p	22	Poilakande	74c	23
Dammeria	101c	30	Primrose Hill	27c	23
Dea Ella	83½c	31	Primston	33½c	21
Deniyaya	73c	27	Pungetty	41p	38
Doragalla	93c	33	Queensland	29c	42
Dryburgh	39p	26	Ratwatte	60c	21
Dumbar	95p	46	Ravana	106½c	32
Dunnottar	90c	33	Robgili	79p	46
Eila	162c	20	Rookatenne	47c	32
Eltton	87c	29	Rowley	35½c	31
Erracht	89c	22	R. S.	19c	25
Fairlawn	51p	38	Ruanwella	79c	21
Florida	73c	14	St. Heilier's	59p	28
Forest Creek	123c	45	St. John's	61½c	52
Forest Hill	27c	27	St. Martin	72½c	20
Gabbala	23½c	19	St. Pauls	163½c	32
Galloola	69c	31	Sadamulle	49c	14
Ganapalla	107c	23	Seenagolla	47½c	59
Glasgow	109p	48	Sirikandura	38c	25
Glassaugh	82p	52	South Africa	75c	27
Glenalla	66c	25	Summer Hill	166c	50
Glen Almond	19c	25	Sylvakandy	110p	42
Glenesk	35c	23	Tavalamtenne	93½c	23
Glentilt	92c	36	Do	61½c	30
Geragama	111c	21	Do	53½c	32
Gonapitiya	104½c	52	Tismada	36c	20
Gwernet	48p	22	Tonacombe	145c	35
Hangranoya	64c	29	Torwood	79c	25
High Forest	80½c	59	Vogan	103c	31
Holton	20c	23	Wadhurst	27c	30
Hornsey	101p	44	Waitalawa	112½c	37
Jak Tree Hill	20c	24	Warakamure	61c	26
Kandaloya	114½c	29	Warratenne	83c	19
Kelani	59c	29	Weemalla	23c	28
Kirklees	66p	36	Wewalkande	38½c	16
K. P. W.	90½c	23	Weyungewatte	60c	26
Kadukande	20c	14	Whyddon	40c	32
Kumaragalla	45p	22	Woodthorpe	50c	23

NOTE.—c stands for chests, ½c for half chests, b for boxes and p for packages.

CRUDE RUBBER COMBINES.

There is, perhaps, no cry—says the *India-rubber Journal*, Feb. 4th—which appeals so much to Englishmen in their love of freedom as that of "No Monopoly." It is only necessary to start the cry and immediately all ranks rally round the standard to break down the work of any individual or association who endeavours to monopolise any industry or interest. Monopolies, as a rule, are only short-lived, but they are liable to disturb the equilibrium of trade, and produce results which have a baneful influence upon commercial life in general. A combination formed to control the crude rubber market can only have a result which would be disastrous either to the industry or to the promoters. Considerable excitement has been recently caused by the reports that a combination has been in process of formation in the United States to control the crude rubber market. Different figures have been stated as to the proposed capital, varying from 10,000,000 to 30,000,000 dollars. It is unnecessary to enter into the alleged objects of this combination, and it is difficult to say what the effect of it would be on the British raw rubber market. From inquiries we have made we are left in an uncertain state of mind as to whether this combination will actually come into being, but the majority of firms with whom we have consulted, allege that the whole thing has fallen through. The report on the market that this failure has come about is doubtless responsible for the fall in price of Para rubber by 2d per lb during the last week. We know many rubber manufacturers who would prefer that the price of the crude material should remain fairly stable, so that they can found their mixings and prices upon a firm basis, which would allow them a fair margin of profit should the market rise or fall but slightly. When, as we have seen during the last ten years, the price of Para can fluctuate from 1s 11d to 5s per lb, the calculations of the manufacturers are upset and considerable trouble is caused. The laws of supply and demand naturally affect the price of raw materials, but supply and demand is not responsible for such startling fluctuations as sometimes prevail. Crude rubber will always be the subject of that speculation which is common to all similar articles, and we can indicate nothing which is likely to prevent such speculation. It may be as well, however, to remind the promoters of such combinations as are here referred to of previous failures, and of the fact that the manufacturer is an important factor in the situation and can do much to upset the plans of would-be monopolists.

A LADY BOTANIST FOR KOREA.

TWO YEARS' SOJOURN IN THE INTERESTS OF SCIENCE.

Miss Constance Taylor, a London botanist, will sail for Korea on February 27, and for two years will be semi-officially botanising in Korea. As Miss Taylor explained to a *Daily Mail* representative yesterday, it all comes about through Korea being largely an unknown quantity as far as the botanical world goes. There are not many places so open to civilisation as Korea, the botany of which is so little known, and it is much more important than appears at first sight to have the botany of a place cut and dried and reduced to specimens. Miss Taylor, while travelling for a few weeks in Korea, became enamoured of the land. And as she is a devoted scientist, and has studied botany very deeply at King's College and other places, her present scheme gradually shaped itself. The Botanical Society, the British Museum, the Anthropological Society, and the Linnæan Society welcomed her idea, and have given her something in the nature of commissions. She will work for them. The Korean Government cordially invites Miss Taylor to submit her results to them.

"Of course, I cannot do it exhaustively in two years," said Miss Taylor, "but I can do a lot. As soon as I get there I shall start collecting all the specimens that are to be obtained, and as I collect them I shall paint them in water-colours. That has to be done most carefully. Then all the

specimens will have to be carefully classified, and in the end the Korean Government may publish the results of my work with all the pictures of flowers, etc. Nobody is going out with me. I shall have no assistance, and very little kit is necessary."

And Miss Taylor is delighted with the project of her two years' sojourn among the Koreans.—*Daily Mail.* Feb. 13.

CINCHONA BARK SHIPMENTS.

According to our cable advices the total quantity of cinchona bark shipped from Java to Europe during January 1901 was 500,000 kilos. as compared with 550,000 kilos. during December 1900, and 307,000 kilos. during January 1900. In the following table we give figures showing the quantity of bark shipped during each month since January 1, 1899 :—

	1899 Kilos.	1900 Kilos.	1901 Kilos.
January	255,000	307,000	500,000
February	465,000	320,000	—
March	488,500	325,000	—
April	498,500	265,000	—
May	476,500	403,000	—
June	566,450	433,000	—
July	470,000	314,500	—
August	601,200	488,500	—
September	616,000	683,000	—
October	479,000	550,000	—
November	681,000	745,000	—
December	313,000	550,000	—
	5,910,150	5,389,000	

[Equal to 13,002,330 lb. in 1899 and 12,856,000 lb. in 1900.—ED, *C.O.*]

During the first half of last month the shipments amounted to about 300,000 kilos. and in some quarters it was expected that the total shipments for the whole month would again be large and on a par with those during the last five months of 1900. It is true that the shipments were larger as compared with the first half of 1900, but, from the fact that since November there has been a slight falling off each month, those who have been of the opinion that all available supplies in Java were rushed forward to take advantage of the high prices which prevailed during the last part of last year, derive some encouragement. Bark shipments, as we have said many times before, are always uncertain, but the opinion is now very general that shipments will show a further falling off during February and also during March, unless there is a substantial advance at the coming Amsterdam bark auction on the 21st Feb.—*New York Drug Reporter.*

THE CAUSE OF YELLOW FEVER

The Liverpool School of Tropical Diseases has received a report from the late Dr Myers and Dr Murham, members of the commission appointed to investigate yellow fever in tropical climates. They say that there are in all cases of yellow fever minute bacilli, and they state that they are of opinion that this is the cause of the disease. They consider that yellow fever is not due to an animal parasite like malaria, nor do they consider that the mosquito plays any very important part in the transference of yellow fever from person to person. —*Daily Mail,* Feb. 18.

IVORY CARVING IN THE PUNJAB.

As the machinery of the administration in India becomes more intricate, the District Officer has less time than of old to study the habits, customs and occupations of the people. It is all the more noteworthy, therefore, to find a young Assistant Commissioner in the Punjab turning aside from the daily routine to trace the development of one of the most interesting of the art industries of the country. Whatever be its limitations and imperfections, the monograph on ivory carving in the Punjab, which Mr. T P Ellis has just published, is an effort on which the anthor and the service to which he belongs may be congratnlated. Generally speaking, the art of ivory carving in the Punjab is much as it was described by Mr. Lockwood Kipling some twenty years ago: it is not an art that flourishes. "At Amritsar great quantities of combs are made, an industry which probably originated with the Sikhs, who are Nazarenes in the treatment of their hair and beard. The ivory combs, paper-cutters and card-cases of Amritsar are ornamented with geometrical open-work patterns of some delicacy of execution, but no great interest in design. Figure-work is but seldom wrought in the Province owing to the predominance of Mussalman notions, and the only figure-carver at Delhi, Fakir Chand, does not appear to meet with much encouragement." Since then, however, says Mr. Ellis, ivory carving in Delhi has improved, and inlaying in Hoshiarpur, but in both Patiala and Amritsar the industry has fallen upon evil days. The ivory used in India is drawn from three sources: Africa Burma and India itself, and the indigenous article is everywhere at a discount owing to its inferiority of quality, due, according to experts, to the food of the animals, but also to inferiority of breed, climate and surronndings. Except in a few instances, the ivory iudustry is confined to the large towns; purchasers being mostly Europeans, work is necessarily conducted near some centre frequented by them. Ivory carving proper may be said to be confined to Delhi, Amritsar and the Patiala State capital. In the former city, Lala Fakir Chand of the Dariba (already referred to) practically monopolises the trade, and, in fact, no one in the Province can compete with him. Bangle-turning, though general throughout the Province, has its chief centres at Amritsar, Dera Ghazi Khan, Gujranwala, Mooltan and Lahore Districts. The great centre of the inlaid work industry is Hoshiarpur, the work of Basi Ghulam Hussan being famous not only in India but throughout Europe and America.

IVORY CARVING IN DELHI

is almost exclusively a hereditary occupation, the system of training being long and arduous, tending to limit the acquisition of the art to families. Thus the family of Fakir Chand has carried on this work for four generations. The training of the would-be artist begins usually when the boy is about ten or twelve. A good deal depends upon individual aptitude, but even with the advantages of hereditary instinct, application, and natural gifts, a period of from twenty to twenty-five years of careful training is required before a workman can be trusted and is considered proficient in all the branches of the art. The master-craftsman employs his carvers at fixed wages, varying according to the capabilities of the man, supplies him with material, sets his task, he himself taking the risk of sale, destruction of material, and the long period of waiting before a return is made for the outlay. Everything is done under the supervision of the head worker, and no one is allowed to take work home with him, as is common enough in the case of other handicrafts. In Lala Fakir Chand's factory the workers congregate in a small room along with wood carvers and miniature painters; some sitting on balconies or on the stairs, and others at the open doors and lattices to obtain sufficient light to work by, and, surrounded by their various implements; the whole scene forms

A TYPICAL PICTURE OF THE INDIAN ARTIST AT WORK.

The whole trade of Delhi may be said to be in the hands of Fakir Chand, who practically supplies all the jewellers in Chandni Chowk. Neither there nor in Amritsar is any special caste identified exclusively with the art, like the *sunar* of the gold and silver industry. Profits vary, of course, but all round it cannot at best be termed a remunerative business. The necessary tools, although rude, are numerous (some 38); altogether considerable outlay is incurred, and returns are long in coming. Good prices are sometimes obtained; in the winter of 1899, for instance, a certain *chef d'œuvre* realised £500; another beautiful carving of some Hindu gods was valued at R2,500; but the latter was executed fifty years before it found a purchaser. The prevailing inadequacy of prices, indeed, is considered to affect greatly the quality of the work in general. It is to be noted, however, that when goods are specially ordered, the greatest skill is devoted to their production, and amongst these the best specimens of work are to be found.

IN AMRITSAR,

the work being of a much less ambitious character than in Delhi, the apprenticeship to be served is shorter and less arduous. Lads at from ten to twelve are bound for six months or a year to a master-craftsman, who sets them to work in soft woods, then on to harder and harder, until hand and eye can be trusted to be employed on the costly ivory, the pay gradually mounting with the degree of skill attained. Here the most that even trained workmen expect to earn is from R8 to R18 a month —a very poor wage compared to that of superior workers in Delhi, but then the best of Amritsar carved work can only be compared with the cheap goods turned out by Lala Chand. The work in Amritsar consists of (1) bangle-making, and (2) toy, figures, and such ordinary useful articles as combs, paper cutters, *zurmadani* (little boxes to contain the black antimony wherewith the Eastern belle intensifies the blackness of her eyelashes), card cases, as also the geometrical and floral designs for inlaying work in wood or metal. Hoshiarpur is described as the main centre of the inlaying industry and manufacture of decorative furniture, although bangle-turning is also carried on to a certain extent. One learns with regret that the future of the ivory carving trade in Delhi is generally regarded as by no means assured, although Mr. Ellis takes a less gloomy view. Naturally the arts are no longer patronised as they once were by Native Courts, while the classes to whom most wealth has come under British rule have unfortunately small pretensions to artistic taste. On the other hand, the market has widened in another direction; year by year the swarms of tourists increase in volume, and artistic products are eagerly sought and purchased, though not always, or perhaps often, with much discrimination.—*Pioneer*, March 2nd.

CHEAP ESTATES IN THE WEST INDIES.

Reviewing a paper in *Blackwood* for February 9th, the *Spectator* says :—

The author of "My House in the West Indies" not only gives a charming picture of the delights of winter residence on the shores of the Caribbean Soa, but throws a good deal of light on the economic situation in a typical West Indian island, in which sugar has been superseded by arrowroot and cacao, and the constitutionally indolent natives are confronted with increasing difficulty in finding the rent to pay for their provision-grounds. The only hope of financial salvation, in the writer's view, is the influx of new blood and new capital; "not winter residents like myself, but young men with enough money, after paying for their estates (which may now be had cheaply enough), to work a small sugar-plantation up to the first crop without borrowed money."

THE UVAKELLIE TEA COMPANY OF CEYLON, LTD.

THE REPORT

was submitted as follows :—

REPORT OF THE DIRECTORS.

The Directors have now to submit their Report and Accounts for the year ending 31st December, 1900.

The crop amounted to 162,110 lb. Tea costing 26·95 cts. per lb. against 152,660 lb., costing 26·82 cts. in 1899. The amount of profit earned is R24,422·54 which is equal to 10 per cent on the Capital of the Company.

After estimating the unsold tea at a safe figure, the crop has realized 43·39 cts. per lb against 41·67 cts. in 1899 which the Directors consider highly satisfactory.

After adding R925-19 surplus proceeds of tea estimated last year and R187·30 balance brought forward, the amount available for distribution is R25,535·03. After paying an interim Dividend of 3 per cent and writing off 7½ per cent for Depreciation on Buildings and Machinery, the profit amounts to R16,297·15, and the Directors recommend that this amount be disposed of as follows :—

By the payment of a final Dividend of 5½ per cent] (making 8½ per cent for the year) absorbing...	R13,200·00
By carrying a sum to Reserve, of...	2,000·00
By the payment of Bonus to Superintendent of	500·00
By carrying forward the balance of	597·15
	R16,297·15

The Estimate for the current year is 162,000 lb. Tea to cost R45,739·50.

In terms of the Articles of Association Mr. W Kingsbury retires from the Board, but being eligible offers himself for re-election. It will also be necessary to appoint an Auditor for 1901. By order of the Board of Directors, J. M. ROBERTSON & Co., Agents and Secretaries.

Colombo, March 1st, 1901.

The CHAIRMAN, in submitting the report, said that as it had been in their hands for some time it might be taken as read. There was not much to say on it. Their tea showed a profit of 16·44 cents per lb and even in their plucking there was a profit of R57·86 this year for each acre. The price realised for the tea this year was 43·39 cents as against 41·67 last year. This profit, he thought, was largely due to the good work done by their Superintendent. He then moved the adoption of the report.

KNAVESMIRE ESTATES COMPANY.

THE REPORT

was submitted as follows :—

The Directors have the pleasure to submit the balance sheet and profit and loss account for the year ended 31st December, 1900, duly audited.

The profit for the year is R24,488·38, to which must be added R4,081·71 balance from 1899.

An interim dividend of 2½ per cent absorbing R10,375 was paid last September, and the Directors propose that a further dividend of 1½ per cent be paid absorbing R6,225, and that the balance R5,294·68 after providing for Directors' fees be carried forward.

The profit earned represents a return of R5·90 per cent on the capital of the Company, and is equal to R50·40 per acre on the area in bearing.

The total tea crop secured was 323,118 lb., or 23,118 lb. more than estimated for. The plucking area was 486 acres giving 664 lb. por acre. Total amount of tea for disposal was 337,232 lb. including 14,114 lb. made from purchased leaf. Tea sold to end 31st Dec. was 285,135 lb. netting R28·49 cents per lb. leaving

52,097 lb., to be disposed of estimated to net R22·43 cents per lb.

Cost of production including all charges and including cost of bought leaf was R20·355 cents per lb. of made tea.

The Company's property consisted on 31st December, 1900, of:—

Tea in bearing	486	acres.
Tea not ,,	15	,,
Jungle	88	,,
Buildings and Waste	5	,,
Total	594	acres.

Estimated crop for 1901 is 300,000 lb. to cost R20·31 cents per lb.

Plumbago.—The mining rights were leased in March to a Syndicate on terms of 1-5th royalty and work was immediately started. The nine months' work since that date has been mostly of a prospecting character, for the land near the first prospecting shaft, which was so favourably reported on by Capt. Tregay, turned out quite barren of plumbago. Two distinct tunnels have been made, and from both cross cuts have been cut. Roughly, 10 tons have been won to end of December, 1900, at which time prospects may be said to have been better than at any time since the work was started.

THE ROEBERY TEA COMPANY OF CEYLON.

THE REPORT.

of the Directors was submitted as follows:—

ACREAGE.

Tea in bearing	497	acres.
,, 3 years old	109	,,
,, 2 ,,	36	,,
	642	acres.
Cardamoms	4	,,
	646	acres in cultivation.

The Directors have now to submit their fifth annual report and accounts, being those for the year ending 31st December, 1900. The yield of tea during the period has been 237,228 lb. costing R26·89 cents per lb., as against R30·32 cents last year; and realising R41·60 cents as against R40·46 cents for the same period.

After providing for commission due to Superintendent and making a liberal allowance for depreciation of buildings and machinery, the amount at credit of Profit and loss is R22,529·61 cents. To this must be added the sum R541·15 cents brought forward from last year, making a total of R23,070·76 cents now available for distribution.

The Directors recommend the payment of a dividend at the rate of 5 per cent on the paid up capital of the Company, which will absorb R15,000·00; that a sum of R7,500·00 be placed to extension account, and the balance R570·76 cents be carried forward to current season's account.

The Directors are pleased to state that £1,000 of the mortgage has been paid off during the year, and their future policy will be to finally liquidate the indebtedness as soon as possible.

The estimate for this year is 250,000 lb. tea on an expenditure of R65,825·00, which includes a sum of R900·00 for clearing and planting up 10 acres of jungle.

The retiring Director is the Hon'ble W H Figg, who is eligible for re-election.

The appointment of an Auditor for the current year rests with the meeting.

THE REPORT

ACREAGE OF THE ESTATE.

	Queensland. acres.	Palmerston. acres.	Total. acres.
Tea in Bearing	254	205	459
Young Tea	4	0	4
Total Tea	258	205	463
Jungle	19	0	19
Timber	0	7	7
Grass, &c.	4	0	4
Total Acreages	281	212	493

The Directors have now to submit their Fifth Annual Report and Accounts, being those for the year ending 31st December last. The yield of tea during the period has been 235,579 lb., costing cts. 26·74 as against cts. 28·08 last year, and realising 44·17 as against 45·63.

As will be seen from the accounts, the net profits for the year amount to R28,277·21 after writing off the sum of R5,261·88 for depreciation on Factory and Machinery. An interim dividend of 5 per cent. was paid on 7th August absorbing R20,500, and the Directors recommend that a final dividend of 1½ per cent. be declared, making a total of 6½ per cent. for the year, and leaving a sum of R1,627·21 to be carried forward.

In terms of the Articles of Association, Mr. Stanley Bois now retires from the Board, but is eligible for re-election.

The appointment of an Auditor for the current year rests with the Meeting.

PRODUCE AND PLANTING.

Cold Comfort.—The circular issued by members of the sub-committee of the Indian Tea Association, which we printed last week, does not meet with the commendation of the "Grocer." That part of the circular in which "all interested in the production of tea" are invited to communicate with their M. P.'s irrespective of party, asking them to support Sir H. Seymour King in an endeavour to get the tea tax reduced to its former rate of 4d per lb, is the subject of special criticism as "not altogether wise." Says the journal mentioned: "The next thing will be, we suppose, to denounce the Government as exacting 'tribute' from India; and possibly that may be followed by an outcry in India itself which may have the gravest effects far beyond the effects of any duty on tea. Then we hear of 'the mischief' and the great damage done by the imposition last year,' and so on. Is it fair to blame the Government either in such a tone or on such a ground? If 'great damage' was done last year, was it not mainly the fault of those in the trade who intercepted part of an impost which would have fallen wholly on the consumer? No one can say with fairness that tea at the price the consumer now obtains it is excessively dear; on the contrary, it is excessively cheap compared with what it was only a generation ago. With as little reason can the fair taxation of tea be condemned. All alcoholic beverages are already heavily taxed (and rightly so), and there is no good economic reason why teetotallers should wholly escape taxation. Providing we do not thereby restrict or render unduly dear the supplies of the people, especially the poor, there is no reason why an article like tea which is almost universally consumed, should not bear a fair import tax for the purposes of revenue. The real question seems to be whether the tax falls or has fallen on the right shoulders. That is to say, in any change of duty, is it of such an amount as to be readily passed on to the consumer, who should rightly bear it? That is a question on which experts in the wholesale trade may and should offer valuable advice to a Chancellor of the Exchequer, but that can surely be done without raising dangerous political questions

and creating imaginary grievances. Granting that the incidence of the duty is not necessarily upon the producer, the latter's hardship should be but of a very temporary nature unless the tax be so high as to destroy trade—which nobody can in this instance pretend it is"

"IMAGINARY GRIEVANCES."—Without attempting to fathom the meaning of the references to "tribute from India" and "those in the trade who intercepted part of an impost which should have fallen wholly on the consumer," we suppose the moral of this is that Indian and Ceylon tea-planters should look on placidly while the industry they have built up is crushed out by the Juggernaut of circumstances over which no one in particular has any control. So long as the tax does not quite destroy their trade planters, instead of worrying the Government and other people with their "imaginary grievances," should bear their troubles with equanimity, and turn their thoughts to political economy and taxation problems. When a man is in danger of drowning, arguments about the depth of the water and how he got into it have no interest for him. The *Grocer* goes on to say:—"The producers in India and Ceylon appear to be suffering mainly from miscalculations—either made by themselves or by those who advised them. Secondly, they are suffering from the miserable failure to arrive at an understanding throughout the trade whereby it might have been possible to pass on the duty to the consumer, on whom that impost was meant to fall. Thirdly, they are suffering from the shortsightedness, not to say foolish avarice, which caused some of them to dump down upon this country so-called 'tea' which was merely rubbish, and should have been treated as rubbish in India and Ceylon. With every desire to show practical sympathy for the Indian and Ceylon planters, we cannot help feeling that they a little over-reached themselves last year; and that their best course now is to pull themselves together without bothering about Government action on this side; and if, rather than stretch again on the rack people such as the income-tax payers under Schedule D who already pay too much, Parliament should think well again to interfere with tea or sugar or what not, it is to be hoped that the producers and importers concerned may be found to have profited by the lesson of last year on the disadvantage of non-combination." To this the producer can say, "Thank you for nothing." Sympathy of the kind here tendered does not amount to much.

THE CALIFORNIA ORANGE CROP.

Estimates of the California orange yield grow larger as the season advances. The estimate of all citrus fruits for 1901, in the San Francisco *Chronicle* annual, was 22,000 carloads, of which 1,145 were set down for central California. The railroad authorities are said to now estimate the southern crop of oranges alone at between 19,000 and 20,000 carloads, of which up to January 19, 4,400 carloads had been shipped, which breaks all records to that date, while 850 carloads have gone forward from the central part of the state. Our contemporary's estimate of the shipments from the district of which Oroville is the centre was 500 carloads, and the Southern Pacific Company now estimates the total crop from that district at between 900 and 1,000, which goes to show that new groves are coming into bearing of which no one knew anything. It is probable, as is usual in good years, that the citrus crop will exceed all estimates and that this will be the most prosperous year California citrus growers have ever known. The abundant rains which have fallen in the southern counties will improve the quality of the fruit and strengthen the vitality of the trees to produce next year's crop.—*Home paper*.

THE TEA DUTY.

[To the Editor of the *Home & Colonial Mail*.]

SIR,—We would solicit your powerful aid towards arousing public attention to the subject of the taxation of tea. It will be fresh in your recollection that last year's Budget laid on this article an additional duty of 2d a lb, being an increase of no less than 50 per cent. We contend that the fiscal burden is wholly excessive, and is alike unjust to consumer and producer.

It is unjust to the consumer. Tea, with a duty of 6d per lb, now contributes about six millions sterling to the Exchequer, or 5 per cent. of the national revenues. The duty exceeds the wholesale price of the great bulk of the tea consumed in this country, seventy five per cent. of the quantity imported being now sold in bond at 6d per lb and under. Thus the duty falls most severely on the poorer classes, and infringes a fundamental law of political economy. If there is one thing which should be encouraged in this country above another it is the supply of a harmless beverage in universal demand. The evils arising from the extensive use of intoxicating drinks are too patent to need enlarging upon; and all interested in promoting the cause of temperance should join in condemning the excessive taxation of tea.

It is unjust to the producer. Under ordinary circumstances the greater portion of the enhanced duty should have been borne by the consumer. But markets are so abnormal as to render this impossible. Prices have fallen in a direct ratio with the enhanced duty. In other words, the latter is being largely paid by the producer. The following table, showing three years' fluctuations in the price of type-tea, places this fact in a clear light:—

Description of Tea.	1899.	1900.	1901.
Indian Pekoes ..	7·73	7·20	5·97
Ceylon Pekoes ..	7·81	7·25	5·21

But this process has its limits. In view of the cost of growing and manufacturing tea, and transporting it 6,000 miles and upwards, it is clear that this burden cannot continue to be borne by the producer. The enhancement in the retail price caused by the increased duty must re-act on the demand to his detriment. The deep injury inflicted on the industry is shown in a serious shrinkage in the value of tea companies' shares, and in a general depression which has no parallel.

The effect of the existing duty on the countries of production is equally prejudicial. Their congested areas are relieved of surplus population by a steady flow of emigrants to the tea districts, and if famine is to be fought it must be by precisely similar means to those employed by the planter. His ruin would be severely felt by the peasantry of India and Ceylon, and the consequent check to the influx of British capital would lower the standard of existence and be prejudical to the interests of both countries.

The industry thus heavily handicapped is one which should be fostered by every legitimate means. Tea differs radically from sugar, which stands in the same category as a constituent of our diet, but pays not a farthing to the Exhequer. Tea employs £30,000,000 of British capital, and is essentially a creation of British enterprise. Half a century back the whole consumption of these islands was supplied by China. In spite of many failures through losses which would have daunted most men, and at a vast sacrifice of life and money, we have succeeded in distancing

our rivals; and the great bulk of our tea is now produced within the limits of the Empire. The following figures are pregnant with suggestion for the Chancellor of the Exchequer. They represent our imports in cwts. of tea and sugar in 1899:—

Importations of	From British Empire Cwt.	From foreign countries. Cwt.
Tea ..	2,188,000	391,102
Sugar ..	1,582,337	29,348,553

In other words, while 84 per cent. of our tea is produced by fellow subjects beyond the seas, 94 per cent. of our sugar is sent us by commercial rivals aided by State bounties.

With apologies for trespassing on your space, We are, Sir, your obedient servants,

D Cruickshank, A Bryans, Vice-Chairmen, the Indian Tea Association, London. Ernest Tye, Secretary.

Indian Tea Association,
14, St. Mary Axe, London, February 21.

RESTRICTION OF OUTPUT.

(To the Editor of the *Home and Colonial Mail.*)

Dear Sir,—The telegrams, of which copies are enclosed, may be of interest to your readers. The planters' resolution referred to, passed at the annual meeting of the Planters' Association on the 16th inst., was in favour of restricting the output of black tea by reducing the plucking area by 10 per cent., and by the manufacture of green tea,—Yours faithfully,

Wm. Martin Leake,
Secretary, Ceylon Association in London.

The following telegrams have been received from Ceylon by the Ceylon Association in London:—"Kandy, February 18th. Ceylon taking steps to reduce 10 per cent. acreage." "Colombo, February 20th, Rosling (Chairman Planters' Association) is very anxious to have the planters' resolution carried out. Colombo agents are waiting instructions from principals. Steps must be taken immediately. Ascertain at once and telegraph."—*H and C Mail*, Feb. 22.

THE DEADLY MOSQUITO.

CHILDREN DIE WHOLESALE IN LAGOS.

Lagos, Jan. 28.—The arrival in Lagos of the Governor, Sir William MacGregor, who was originally a doctor in Fiji, has been followed by a noticeable impetus in medical affairs, just as the rule of Governor McCallum, an engineer, did much for the public works. The present Governor is credited with the determination to wage ceaseless war on the dreaded mosquito, convicted of being a malaria propagandist. An excellent hospital has been maintained here, and it has been said with grim humour that a man in Lagos dies luxuriously in comparison with some ports less advanced. The advice to a newcomer of the old coaster at one port: "Keep friendly with the Wesleyans, they have a hearse," is quite unnecessary here; and certainly the death-rate during the last year or two shows signs of marked improvement—as regards the white community. The children, however, are not so fortunate. Nearly half the negro children born here die before reaching twelve months. According to the latest returns available—those for 1899—out of 1,929 births registered 864 children died within their first year, a death-rate of 447·9 per thousand, or nearly one half.

It is supposed that this dreadful mortality is caused by malaria. Every child born has to pass through the ordeal of acclimatisation—at least, the blood of those examined has revealed the presence in large numbers of the malarial parasites. To thoroughly sift a question so vital to the population of the Colony, a Commission has been formed, consisting of one European doctor, one native doctor, and a lay member, to inquire into the probable causes and cure of this mortality. If the inquiry shows this to be due to malaria, then it is probable that the compulsory administration of quinine among the native children, in conjunction with other measures in view for the destruction of the breeding places of the anopheles mosquito, may do much to save many infant lives.—*Daily Express*, Feb. 19.

Value of Bees.—A scientist estimates that bees in an ordinary colony will visit 2,000,000 flowers in a day or 200,000,000 in a season. If they fertilize one-tenth this number, and the fertilization of 20,000 workers is worth 1c., then a single colony is worth $10 a year for this purpose alone.—*American Agriculturist.*

Coconut Oil.—We are much obliged to the mercantile correspondent who throws so much light on the trade in, and distribution of, one of our most important staples, in the letter we give elsewhere. The fact that America has been buying coconut oil in the London market last year, shows how difficult it is to arrive at exact conclusions as to distribution.

Cocoa.—The consumption of cocoa is steadily going ahead. Germany heads the list of consumers, taking 39¾ million lb. in only eleven months, whilst the United States come next with an estimated consumption in twelve months of 39 million lb., and the United Kingdom is third with 38 million lb.; then comes France (34½ millions), Holland (24 millions), Belgium, Spain, and Austria. Russia, who, with its 94 millions of population in Europe alone, her cold climate, and large army, might be looked on as a likely customer for cocoa and chocolate, evidently is not so, for her name does not appear in a recently published list at all. The total quantity consumed by the countries mentioned amounted to 194 million lb. last year, against 107 millions in 1894.—*Home & Colonial Mail*, Feb. 22nd.

Coffee.—There is no doubt the cost of production [of coffee] is constantly changing in all countries. What the real cost of production is, and what will check increase of production of coffee, nobody has so far been able to determine in a satisfactory way, and as production is still increasing, not decreasing, all talk from coffee-growing countries everywhere in reference to the hardships of present prices may be dismissed from the minds of coffee people. It is apparent that the coffee world at large continues very nervous, and at the slighest improvement, due to any cause, no matter how slight, speculators are for ever claiming or clamouring for higher values under the misconception that minor causes can materially alter conditions.—*W. H. Crossman & Bros'. Circular.*

LORD CURZON AND TEA PLANTERS.

We direct special attention to the following important extracts from the recent speech of the Viceroy, dealing with the "Exchange" and "Tea Overproduction" questions. These give the official view of the Exchange problem in opposition to Mr. R. H. Elliot, and afford most sensible advice in regard to promoting a taste for tea throughout India. It would pay if the planters set aside 10 per cent—that is of inferior grades up to that proportion—to be devoted to exploiting both the opposite Continent and this island, in the way Lord Curzon points out:—

THE EXCHANGE QUESTION.

In his concluding speech on the Assam Labour Bill at the last meeting of the Supreme Legislative Council, the Viceroy remarked:—

There is another claim that was specially put forward by the Hon. Sir Allan Arthur which I must equally decline to accept. It is the claim that we owe some special reparation to the planters for the currency policy, which, by raising the rate of exchange, is alleged to have raised against them the cost of production. Now this case was argued before the Currency Commission in London in 1898 by prominent representatives of the planting interest, and I do not hesitate to say that it completely broke down. It was conclusively proved before that Commission that the depression in the industry was due not to the closing of the Mints by the Government of India, not to the fiscal policy of the Chancellor of the Exchequer in raising the tea duty, but over-speculation, over-competition, and over-production. I have gone very carefully into the figures, and they show most conclusively that whereas in the nine years preceding the closing of the Mints, *i e.* from 1885 to 1893 inclusive, the area under tea cultivation in India increased by 39 per cent and the quantity produced by 85 per cent in the six years following upon the closure of the mints, namely 1894 to 1899, the area increased by a further 43 per cent, and the produce by a further 76 per cent., while in 1899 the increase in production was double what it had been in any previous year. So much for all India. I will next take the case of Assam alone. In the nine years from 1885 to 1893, the increase in area was 39 per cent., in production 75 per cent. in the six years from 1894 to 1899 it was 18 per cent. in area and 67 per cent. in production. Further, if we eliminate the years 1893 to 1897 while the rupee was steadily rising from 13d to 16d, and if we take the years posterior to 1897 only, during which the rupee reached and maintained stability, we shall find that in the two years 1897-99 there was an increase of 20,000 acres in Assam alone brought under cultivation, and of 21 million pounds of tea produced. Moreover, the fall in the price of tea, about which we have heard so much, continued long after exchange had become stable. It is clear, therefore, to me that the argument derived from the closure of the Mints is of very little value: and that the tea industry has been disastrously affected not by the currency policy of the Government of India, but by the ill-considered rush of speculation, and by the production of more tea than there were markets to purchase or mouths to swallow.

A TEA MARKET IN INDIA.

The Viceroy continued later:—

"I am a believer in the policy of helping those who know how to help themselves. I see the tea merchants of India and Ceylon scrambling for the markets of England, the Continent, and the United States of America. Why do the Assam planters not recognise that there lies the most splendid market in the world at their doors? Millions of Indians now burn kerosene oil, consume ice, carry umbrellas, and smoke cigarettes. Twenty-five years ago these habits would have been scouted as impossible. Now they are common and in some cases universal. Why do you not tempt these people also to drink tea? What is the good of scouring the world for the thousands? You have the millions at your gate. If I were a planter in Assam I would never rest till the pluckings of my garden became the staple drink, of the Indian artisan in place of the spirituous poison which he is now tempted, for want of anything better, to pour down his throat. I give you this suggestion for what it is worth; and, whether it be taken or not, I hope that Honourable Members will at least admit that throughout the controversial discussion of today the Government has shown itself a critical but not unfriendly champion of the composite interests of the most interesting Province of Assam.

DUM-DUM BULLETS FOR USE IN SPORT.

NOTES ON THE ·300.

(To the Editor of the Asian.)

Sir,—In a former letter, written from Ceylon, I mentioned that the mark IV hollow-nosed bullet could not be relied upon to expand properly, even in so tough a creature as a crocodile. Sometimes these bullets expand perfectly; at others, under apparently the same circumstances, they make a wound but little larger than that caused by the ordinary Mark II bullet. I have lately been trying the dum-dum bullet on blackbuck, chinkara, crocodiles and smaller animals. I have come to the conclusion that it also is very unreliable for shooting game. A crocodile hit about the right place through the shoulders got back to the water without any signs of distress. Another one raked fore and aft, left his sunny sand-bank with great nimbleness. In neither case was there any after disturbance of the calm water to show that the reptiles were suffering pains below. On another occasion I fired at a black buck, the range being about 180 yards. The buck fell to the shot, but almost immediately recovered himself and made off. I followed after him and fired two more shots which, as they produced no visible effects, I took to be misses. The buck moved away slowly and by keeping out of sight behind some scrub, I was enabled to get a fourth shot which killed him. I then found that all four of my shots had hit the antelope, and moreover that any one of them, had it expanded, would have killed or disabled the animal at once. Another case was that of a chinkara. He was hit far back in the haunch with a Dum-Dum bullet, and made away slowly. I eventually cut him off, and killed him at short range with a 192-grain hollow-fronted sporting bullet. The difference in the two wounds was most noticeable, the Dum-Dum had not expanded at all, while the sporting bullet had made an enormous hole. A jackal hit about amidships with a Dum-Dum ran fifty yards

before falling. A Sarus crane, shot through the points of both wings, ran seventy or eighty yards and then fell dead. I have heard it asserted that the soft-nosed sporting ·303 bullet is badly balanced, and that it does not shoot accurately. My own experience has been that it is most satisfactory in every way. I have also no fault to find with the 192-grain hollow-point; this last bullet from its lighter weight has no doubt a higher muzzle velocity than the 215-grain bullets, and this extra speed makes it break up all the more thoroughly. The Geffery split jacketed bullets I have not tried myself. There is no doubt, however, that they are noisy in flight, less accurate than the other types, and that when the nose is cut off as well as the jacket slit, they occasionally break up in the barrel. They are, however, very effective on game. The hollow-fronted 192-grain bullet is somewhat safer than the Dum-Dum, as it is more likely to break up on striking the ground. The Dum-Dum is a most alarming missile in a thickly-populated country, as after passing through a buck and striking the ground beyond, it goes humming away with energy enough to kill a man hundreds of yards further on. Altogether I think the ·303 is a most unsafe weapon for black buck shooting, as these antelope are so often found right among the cultivation with natives on all sides of them.

A further objection to the ·303 is the amount of trouble that is necessary in order to keep it properly clean. Of course pull-throughs alone are not sufficient; a clearing rod is necessary and the bolt should be removed, and the rifle thoroughly cleaned out from the breech, an old brush with worn-down bristles is an excellent thing to put a rag round, and much less trouble than the ordinary jag. I found this out with a ·250 rifle; for the rod and brush of a Morris tube proved first rate for wiping it out, when the diameter of the brush had been slightly increased by placing a bit of thin rag around it. Curiously enough I see that Mr. Tippins in his book, "modern rifle shooting in peace, war, and sport" mentions that he too has found an old brush, with the bristles shortened, the best form of jag for rifle cleaning, as the bristles hold the rag firmly, and the cleaning flannel thus used never gets stuck fast in the barrel, as it does sometimes with a pull through. A ·303 wants very conscientious cleaning to keep it in good condition. One may wipe out a rifle most thoroughly and oil it carefully, and the very next day a rag passed through will come out black. My own method is to wipe the rifle as clean as possible, directly after shooting, and oil it well with the usual ·303 oil, which contains mustic soda. The following day I wipe thoroughly clean again, and oil afresh; then about the third or fourth day, I wipe out all the oil and coat the bore with vaseline. The rifle can then be left to take care of itself till it is next wanted. If some such precautions are not taken, a ·303 will soon go off its shooting. I think there is a tendency now-a-days to make rifles too light. It is much easier to shoot with a weapon of moderate weight, say about 8 lb., than with these feather-weights of under seven. Any ordinary man can carry an eight-pound rifle without fatigue, and would probably find that he shot better with it, on the whole, than with a lighter weapon. As an example, the extra light weight, 1886 Model Winchester, which weighs from 6¼ lb, to 7¼ lb., according to whether it is a "Take down" or not, requires to be differently sighted, if it is to be used with smokeless powder. The ordinary sporting Model 1886 rifle of 8¾ lb. shoots alike with the same sighting whether black or smokeless cartridges are used. The cartridge used in the extra light-weight 1886 Model is the ·45—70, which as well as the ·45—90 one can now obtain loaded with smokeless powder.

The sole reason which makes the modern small bore rifle so dangerous for use in thickly populated districts, is the length and weight of the bullets employed. A short light bullet, which would expand readily, would get rid of most of the danger, and be quite sufficiently deadly for chinkara and black-buck. I believe a soft-nosed bullet of 150 grains would be just about right. A considerable amount of muzzle velocity would moreover be gained with a light projectile, and the trajectory flattened over sporting ranges.—"FLEUR-DE-LYS."

THE INTRODUCTION OF TROUT INTO KASHMIR.

PROCESS OF THE EXPERIMENT IN PISCICULTURE.

(To the Editor of the Pioneer.)

SIR,—I have read the article in your paper dated 8th February 1901 regarding the experiment now being made to introduce trout *(salemo fario)* into the streams and lakes of Kashmir and as I have been entrusted with the care of the ova I am in a position to give you an account of the progress made so far and of the facts which have been established. Under the care of my friend Mr. J S MacDonell who went from Kashmir to Bombay for the purpose, the box containing the ova reached Srinagar on 19th December 1900, and on opening it, we discovered to our joy that the contents were in as good condition as could be expected after the long journey. A few improvements in the method of packing the ova suggest themselves, but without going into considerable detail it is not possible to describe them here, nor would they be of general interest to your readers. The main fact is that out of 10,000 ova shipped 7,000 were, on arrival at Srinagar, considered fit to be transferred into the hatching boxes, but of these a certain number were as was to be expected, doubtful. Had the ova which was shipped in 1899 arrived safely, I would have been in a better position to make the experiment, as His Highness the Maharajah had then permitted the use of the Dilwar Khan Bagh for the purpose. In it the hatching boxes and rearing tanks would have been close together and there would have been no risk in transferring the fry from the one to the other. Owing to a mistaken idea that the experiment had proved a failure and had been abandoned finally, the Dilwar Khan Bagh had been assigned for other purposes and was not available when a cable advising despatch of the ova arrived. I had therefore to

CONDUCT THE EXPERIMENT IN MY OWN VERANDAH

and as it turned out it was just as well that I did so. I am however indebted to His Highness the Maharajah for the use of the town-pipe water for the first part of the experiment, viz. the hatching and care of the "alevins"—also for the use of a suitable stream for the second part of the experiment, viz. the rearing of the fry after they have emerged from the "alevin" stage until they are fit to take care of themselves in the great struggle for existence which lies before them. I may here explain that an "alevin" is an

embryo trout just emerged from the ova with the umbilical sac which provides it with its first nourishment: a very quaint-looking object indeed and delicate in the extreme. For the first two days after the ova had been placed in the hatching boxes, a considerable number of bad eggs had to be removed, an operation requiring the most careful manipulation: a certain number of "alevins" were also hatched out. But for the next eight days the number of white, and burst eggs dropped to an average of between 20 and 30 daily and the hatching out ceased almost entirely.

On 29th December, 1900, the pipe water was suddenly cut off without warning for a period of four hours and I had to put my servants on to carry water from a well in the compound in order to maintain a steady flow through the hatching boxes. On the re-opening of the pipe supply a rush of very dirty water followed, overflowing the filter-boxes and it took another four hours' work before we could get the deposit removed from the ova and hatching boxes and then only with the loss of many broken eggs. The burst eggs seem in many cases to be due to the "alevins" trying to hatch out head first, the result, no doubt, of the shaking the ova has been subjected to. Sometimes we are able to assist nature, but in most cases the eggs are lost when this takes place. The rise in temperature when using well water hurried on the hatching which went on much more quickly until the night of 7th January 1901 when the water was again cut off from 10 p.m. till 9 a.m. on the 8th, during which time a

CONSTANT STREAM OF WELL WATER WAS MAINTAINED

by buckets. The change of temperature had again a marked effect and the hatching out was completed with the exception of some 20 or 30 ova, most of which ultimately proved to be bad. The change also had a bad effect on the "alevins" and nearly 100 dead ones had to be removed when the grills were lifted after the hatching out was completed. For the next few days the casualties did not exceed four or five daily till the 11th January when the pipe water was for the third time cut off and well water had again to be used, causing some 30 deaths. At this stage of the proceedings, although the bulk of the "alevins" seemed fairly healthy, they remained bunched up in a torpid state at the lower end of the hatching boxes; some however seemed to suffer from dropsy or blue swelling, but as they appeared to do best when left alone, I did not attempt to treat these to the pin-prick remedy suggested by some rearers.

On the morning of 19th January, heavy snow having fallen during the night, I took out 65 dead "alevins," the cause of death being apparently dropsy; and the climatic change had evidently hastened the end of the delicate ones. On the following day 35 dead ones were found and from this time forward till the 7th February 357 in all were removed.

On the 7th February, the fish having to a great extent absorbed their umbilical sacs, I commenced feeding with excellent results, and from that date I have only lost 24 fish in all, although there are still some deformities which can hardly be expected to survive. I estimate, however, that there are now

NOT FAR SHORT OF 5,000 HEALTHY FRY IN THE HATCHING BOXES,

and the fact is therefore established beyond all possibility of dispute that trout ova can be successfully imported into Kashmir. I should mention that on 16th January and again on 29th January I found a large shrimp in the hatching boxes. These had no doubt been introduced with the well water; but whether they had penetrated the filter screens as tiny microbes, or had climbed over the screens in a more advanced stage it is difficult to say. I have little doubt that they were fattening on the helpless "alevins" when discovered.

On the 3rd, 4th, 5th, and 7th February I took out smaller shrimps dead. In these cases I think the tables had been turned and the shrimps had been killed by the stronger "alevins." These freshwater shrimps which are found in nearly all Kashmir waters will prove excellent food for the trout hereafter, and I think there need be no anxiety as to the food supply if once the fish are able to take care of themselves. The experiments made by the 5th Gurkhas under Captain Kitchen's direction in 1896 have proved that

TROUT THRIVE AND INCREASE IN SIZE RAPIDLY WHEN PUT INTO A SUITABLE STREAM,

and if that is the case at Abbotabad the same or even better result, may be hoped for in Kashmir. The first stage of the experiment may now be regarded as a success, but there are great difficulties still to be surmounted before your readers will have a chance of luring my speckled beauties with an artful fly. Indeed the second stage of the experiment, now about to be undertaken, gives me almost as much anxiety as the initial one. The rearing tanks are situated at a distance of 12 miles from the hatching boxes, and I fear I shall lose a lot of fry in transporting them to their new home. Every care will be taken, but only those who have tried it know how difficult it is to guard against loss. I can only hope for the best. In the meantime Captain Godfrey writes that our good friend the Duke of Bedford is sending out

ANOTHER SUPPLY OF OVA, WHICH IS DUE IN BOMBAY ON 22ND MARCH.

If we are able to afford the funds, the same care will be taken to get this consignment up safely as was bestowed on the last one. When on this subject I may mention that the Punjab Banking Company, Srinagar, are the Treasurers for the "Kashmir Fishing Club;" and that subscriptions are urgently wanted from Messes, Clubs and private purses: *bis dat quicito dat.* There are many people to whom I would like to exprces the thanks of the Fishing Club: to the Steam Navigation Company who brought out the ova, and especially the chief officer of the vessel in which it came; to the Customs and Railway authorities in Bombay, and to Mr Dhanjhibhoy, the proprietor of the Imperial Carrying Company; but perhaps I had better leave this pleasing duty to the Honorary Secretary, Coaptain Godfrey, who is expected to reach Karachi on his return from furlough about the 15th March —*Srinagar.* F. L. MITCHELL,

Pioneer, March 4th.

COCA-LEAVES are decidedly scarce. There is a good inquiry for Bolivian leaves, but there are no good green to be had. The nominal value is from 1s 1d to 1s 2d per lb. Sales of Truxillo have been made this week at 1s 3d per lb, leaving a stock of less than 5 cwt in hand.—*Chemist and Druggist,* Feb, 23.

FRUIT SEASON AT NUWARA ELIYA.

A VISIT TO MR. JOHN COTTON'S ORCHARD.—Our Nuwara Eliya correspondent writes :—

Visitors to Mr. John Cotton's orchard at Lake View will be agreeably surprised at the loads of English and Australian fruit that may be seen on the trees. Most noticeable for colour and appearance are the plums, five varieties of which have been successfully grown, viz. :—(1) The Red Heart Plum, (2) the Burbank, (3 and 4) Japanese Plums of two sorts, (5) the ordinary variety. Of the above varieties the Red Heart is the best in the orchard. The trees (which are three years old and now carry their first crop) were grown from cuttings from grafts produced in the orchard. Many of the fruits borne by them have attained the size of the smaller apples of the Ceylon market, while the smallest are larger and plumper than the largest plums that have ever been grown in Ceylon. The colour of the frnit when ripe is blood-red. The flavour is delicious, albeit a poiut of appreciable acidity prevails, as is the case with all plums. Two of these plum trees yielded 6 lb of fruit at one gathering. The Burbank Plum is much the same as the Red Heart in appearance, except that the colour is not so dark, being of a yellowish red. The flavour too is not so delicious owing to what is called a "woody" taste, peculiar to the latter. The parent tree, on which these and other plum grafts were produced, was brought out as a cutting by Mr. H W Kellow at Mr. Cotton's request, and may be still seen in the orchard. The Japanese trees are not in fruit, being too young to bear; but they look very promising. A fruiting bush that has been very successfully grown is the Currant (the black and the red). These are perhaps the best specimens of growth that may be seen anywhere in the island.

The pears and peaches are not what may be correctly called prolific; but the fruit on the trees is second to none in Nuwara Eliya in point of size. Lemons too have borne well.

A plot of strawberries (about 30 by 40 ft) yielded as much as 300 lb of fruit, at a gathering towards the end of the last year aud the beginning of this, and Mr Cotton says that he can safely count on another hundred pounds before the season goes out.

Three English (grafted) Apple trees in the orchard look very promising, and are at present covered with foliage.

Fruits, all about the place, are doing exceptionally well and Mr Cotton is to be congratulated upon his intrroduction and successful cultivation of the beautiful pums. Vegetables are not so flourishing up here and it is seldom one sees such good cabbages, celery and leeks here as those that come from Kandapola, Uda Pussellawa and Hakgalla way.—Local "Times."

MYSORE PLANTING NOTES.

SOUTH MYSORE, March 11th.—The coffee blossom which resulted from the recent rains has, ou most estates, been a particularly disappointiug oue. Young coffee has, however, done well, and on this class of coffee the quantity of blossom was all that could have been desired. Old coffee which requires longer to bud up will have another nice blossom later on if we are only favoured with a month of fine weather. Crops, however, on the whole will this year be surprisingly bad, as the recent heavy bearing and severe attack of leaf-disease late last season have left their usual legacy in the way of dry trees. Some splendid results have of late years been obtained from the application of tank silt and lime in this District. In a bad season, like the present one, it is particulary noticeable how well coffee looks under the jak tree. In going round coffee estates looking at the recent blossom, one could not fail to notice how vigorous the coffee was looking under this formerly much-abused shade tree. The show of blossom, too, was good, being far better than the show under many other descriptions of shade in the vicinity. The fact that the jak tree, apart from its mulching and manuring deposits, is an *evergreen* tree and does not expose the coffee beneath it to the sudden trausition from dense shade to the open at the termination of the South-West Monsoon—as is the case with many other shade trees, the Geraweggay and Howligay especially—is undoubtedly one of the chief factors in bringing about this result. The ravages of the borer and the bad after-effects of leaf disease are minimised under this excellent shad-tree.—*Madras Mail*, March 14.

PORTMORE TEA CO. OF CEYLON.

REPORT OF THE DIRECTORS.

The Directors have the pleasure to submit the General Balance Sheet and Profit and Loss Account for the year ending 31st December, 1900, duly audited.

	£	s.	d.	£	s.	d.
The net amount at credit of Profit and Loss after providing for General Expenses, Income Tax, &c.				5,407	1	4
To which should be added Balances brought forward from last year				477	13	7
				5,884	14	11
An interim Dividend of 5 of per cent was paid July 30, amounting to	2,000	0	0			
It is proposed to pay a final Dividend of 8 per cent (making 13 per cent in all, free of Income Tax) which will absorb	3,200	0	0			
And to carry forward to next year	684	14	11			
				5,884	14	11

In presenting their Fourth Annual Report, the Directors have pleasure in recommending a dividend of 13 per cent.

The Tea Crop from the Estates for year ending 31st December, 1900, has been 265,710 lb, being at the rate of 553 lb per acre against 510 lb per acre last year, the highest previous yield, and this increase has been attained by tne ordinary system of cultivation and not by the application of manure.

The cost of production has been £4,653 15s 11d, being at the rate of 4·20d per pound, and the crop has netted £10,544 0s 9d, being 9·52d per pound equal to a profit on the capital of the Company of 14·72 per cent.

The average rate of exchange has been 1s 4 9·64d against 1s 4 13·64d during 1899.

Mr. R C Bowie retires from the Board by rotation, but beiug eligible offers himself for re-election.

The latest reports from the Manager in Ceylon show that Estates, Buildings and Machinery are in a satisfactory condition, and the estimate of crop and expenditure give promise of continued good results, but in accordance with the scheme put forward by the Indian and Ceylon Associations the Board has issued instructions to the Manager in Ceylon to reduce the plucking area during the current year.

The Directors feel that great credit is due to Mr R G Grant, the Manager, and Mr. H A Grigg, the Superintendent, in Ceylon for the way in which they have cultivated the Estates and maintained the high quality of the Tea during the past year.

By Order of the Board,
SHAND, HALDANE & Co., Secretaries.

TEA IN THE ANDAMANS AND NICOBAR ISLANDS.—We direct attention to the interesting summary of progress with the tea experiment in the Andamans, on page 692. So much in earnest are the promoters that the nearest markets, the Nicobars, are being worked for all they are worth; and alcoholic drinks only too popular there, are being rapidly displaced by gifts of tea-pots with the tea introduced.

THE MAZAWATTE TEA COMPANY:

HOW TEA PAYS THE BIG DISTRIBUTORS.

By the mail we have received a circular inviting applications for 26,000 five-per-cent. cumulative preference shares in this Company, of £5 each (all the unissued preference shares), at a premium of 5/- per share. Applicants may, on allotment, pay up the whole balance in advance, and will be allowed interest at the rate of £4 per cent. per annum on the amount so paid in advance. Dividends will be payable in the months of July and January for the half-years ending 31st June and 31st December. The first payment will be calculated from the dates fixed for payment of the respective instalments up to 21st June, 1901. The minimum subscription on which the directors may proceed to allotment is £100,000. It is added:—During the past year the process of consolidating the Company's business premises has been proceeding; the building of the new factory at New Cross has been pressed on; the tea department is now established there; the necessary new buildings to enable the Company to commence business in cocoa and its allied trades have also been proceeded with and are in course of rapid completion. The registered office and sale rooms have been removed from Eastcheap to the Tower Hill Warehouses, which have been converted and altered for the purpose, and when finished will form a complete business establishment in a fine position. Owing to the very much greater volume of trade, the rise in the tea duties, and the extension of the basis of the Company's operations, a larger amount of working capital is required. The Company's capital has been increased accordingly by 20,000 five per cent. cumulative preference shares of £5 each, and 50,000 ordinary shares of £1 each, making the total capital of the Company £400,000 in preference and £400,000 in ordinary shares. All the un-issued preference shares (26,000 in number) are now offered at the price of £5 5s per share. The 50,000 further ordinary shares are kept in reserve to provide for future capital requirements, and may be issued as and when the directors think fit, but at a premium of not less than 10s per share. The directors do not contemplate issuing any debentures, and the articles of Association provide that no issue of debentures or debenture stock shall be made without the authority of an extraordinary resolution duly passed by the Company in general meeting. The last annual report and accounts show £75,000 has been placed to reserve in the five years of the Company's trading:

The dividends paid by the Company on its ordinary shares have been as follows:—

1896..	8 per cent
1897..	8 per cent
1898..	8 per cent
1899...8 per cent with a bonus of 1 per cent =	9 per cent
1900...8 per cent with a bonus of 1 per cent =	9 per cent

The preference shares at the price of issue will return to the investor £4 15s 3d per cent. It will be seen from the profits of the past eight years that the dividend is very amply secured. The amount required to pay the dividend on the whole 80,000 preference shares is only £20,000.

"MANURES" REQUIRED TO IMPROVE THE QUALITY OF TEA:

MR. MANN INSTANCES THE PARALLEL CASE OF VIRGINIAN TOBACCO

One of the most interesting speeches made at the Calcutta meeting of the Indian Tea Association was by the Scientific Expert, Mr. Mann. We quote the remarks in full as of special interest to Ceylon producers at this time:—

MR. MANN said: The Chairman has asked me to say something about the tour recently made by me in the tea districts and in the course of which I visited almost every section in Assam. There was nothing which struck me more during the whole of that tour than the fact that during the past few years there has been a continual expansion of tea, and really without any effort or very little being made to keep up the production of the area already under tea; in fact one or two gardens which I saw gave figures that seem to show that with the area doubled the product of tea was precisely the same as it had been before. I cannot help the conviction that the whole of that decreased reduction per acre under tea cannot be explained by any method of finer plucking. What we need is a concentration of attention to the area already under tea. To say the least, it is a bad thing to go on extending the tea area without giving time, attention or money to keeping up the production of the area already under tea. At the present moment it does not seem the idea of the Committee or of the tea industry to increase production at all. The idea is more that we should devote our attention to improving the quality, or rather keeping up the quality we have already attained to. There seems to be no doubt that during the past ten years the quality of the tea from a very large number of the Assam gardens has deteriorated; that is more especially the case on those districts which have up to the present been famed for a high quality of tea. I am at present devoting more attention to this point than to any other. My investigations at present are directed to finding what constituents in the soil render it capable of producing high quality tea and what constituents are present in those gardens which are or have been famed for the quality of the tea they have produced. This improvement of retentive quality may be dealt with in different ways; one is fine plucking. Here I should like to make a distinction which is not always made between fine and close plucking. Fine plucking I don't think will improve the quality of the tea to any great extent; on the other hand, close plucking will undoubtedly do so, but at the expense of the tea bush. Therefore one will have to balance the gain by an increased product with the injury to the tea bush caused by close plucking. Another way of dealing with the subject is to ascertain what measures are likely to improve the quality. This has been the line which has been followed in America in relation to other industries with great success. I might instance tobacco in Maryland and Massachusetts where the quality has been improved to a very appreciable extent, and on similar lines I think we may im-

prove the quality of our tea. At any rate I am at present working on these lines, not so much to increase the quantity per acre as to improve the quality from the same garden. The questions such as pests, blights, the manufacture of tea etc., I hope to deal with later. But at the present time the question of the improvement of tea in quality by methods of plucking, pruning, and manuring seems to be the most important, and to that I am devoting my chief attention. (Applause.)

TEA IN THE ANDAMAN AND NICOBAR ISLANDS.

The Government Tea Plantation in the Andaman Islands has been doing well. The latest report issued states that 80,000 lb. of tea were made during the year and sold at a net profit of R13,000. The labour employed on the gardens is all convict labour, and as sufficient of it cannot be spared to work them efficiently their out-turn has suffered. The manager states that he could have made more tea, had he had the labour. Owing to the extensive building operations on the Islands, that were in progress at the time, it was not found possible to detail more than a small portion of the labour force for the work of the tea gardens. Now, however, that the tea gardens have passed the experimental stage, and have proved themselves a paying speculation, it is probable the Administration will arrange to amply supply the manager's requirements. There is a good demand for the tea produced, so much so that the supply is not equal to it.

An attempt has been made to create a taste for tea amongst the natives of the Nicobar Islands, who are very partial to the fermented beverage known under the name of *Tari*, or in truth of any descrption of ardent spirits they can get hold of. Under the influence of arrack, and other vile concoctions surreptitiously introduced, the otherwise peaceable aborigines have been giving the officials responsible for their welfare a considerable amount of trouble. To supplant the place of the various alcholic drinks, the Andaman Island officials have introduced into the Nicobar Islands packets of Port Blair tea together with teapots. The tea and the pots have been distributed amongst the influential inhabitants of the islands, and they have been instructed in the art of brewing tea. It is hoped that by these means the islanders will mend their ways and ultimately give preference to the cup which cheers but does not inebriate. The experiment is certainly a step in the right direction, and is an example the Indian Government might well follow. In connection with this subject we would suggest that prisoners in Indian jails should be supplied with tea and be moreover taught the proper way to brew it. As prisoners do not get liquor in jail, were tea supplied a taste would be created for the beverage, and on their release the prisoners would purchase tea, having once got accustomed to it. Every little helps a little, so we put forward the suggestion for what it is worth —*I.P.G.*, March 9th.

GAME AND FISH PRESERVATION ON THE NILGIRIS.

A perusal of the last annual report of the Nilgiri Game and Fish Preservation Association, while satisfactory in respect to the efforts of that body to preserve the indigenous game of the district, is disappointing in so far as it shows that nothing was done by way of importing exotic birds and beasts, which at one time formed no inconsiderable part of the Association's operations and rendered the district an attraction to the sportsman. That was ten or eleven years ago, when chikore were imported, pheasants reared in captivity and subsequently let loose in the sholas that abound on the Nilgiris, and rabbits, partridges and peafowl introduced. In 1892, for instance, 39 chikore were turned out, and in that year two were seen in a state of liberty and in the next a covey of 15, but nothing afterwards. The obvious inference is that the birds either failed to breed or were shot down, and no subsequent attempt to introduce them appears to have been made. Several members of the Game Association tried to introduce pheasants to the hills, but their efforts proved unsuccessful. Mr. Hodgson on one occasion brought 12 birds with him from home the previous year. They were under the personal care of the importer for some time, and are said to have laid eggs; but at that stage the progress of the experiment terminated, so far as anybody knows. Mr. G Oakes spent over a thousand rupees in importing pheasants from England at his own expense, but he seems to have arrived at the same conclusion as Mr. Hodgson did, namely, that there was something inimical in the climate. The last batch of his pheasants, however, did not prove this, for they fell a prey to a marauding jackal which gained entrance into the pen where the birds were kept during the night. Rabbits appear to have been thought of in consequence of a reported scarcity of hares: but doubt was expressed whether the hares were really being killed off, and so no very great interest was taken in watching this part of the Association's efforts. The

EXPERIENCE OF CEYLON AND OF AUSTRALIA,

too, in regard to rabbits, rather alarmed the members, and the first or second importation was not repeated. Patridges and peafowl were tried, birds were procured and distributed, but these efforts were afterwards relaxed, except by Mr. Hodgson who successfully reared them at Kartairy. Guinea-fowl also were tried, but abandoned before much success attended the experiment. It is a curious fact that, in the first years of the existence of the Game Association of the Nilgiris, many sportsmen spent considerable sums in introducing game birds, such as guinea-fowl, partridges, pea-fowl, Himalayan pheasants, and the like, at a time when the law gave no protection to these exotic birds, but now that the Game Act has been so amended as to do so effectually, nobody has enterprise enough to carry on the experiment. The Association, in order to develop this part of its work, is anxious to raise the annual gun license from 30 to 50 rupees, but there is little hope of success for this proposal, as a large number of licensees are protesting against the enhancement, and it is very probable their remonstrances may influence the Madras Government, especially as the principal argument relied upon is the necessity for the destruction of wild pig and porcupine, which cause much damage to growing crops.—*Pioneer*, March 11th.

RUBBER IN SOUTHERN NIGERIA.

HOW THE INDUSTRY IS FOSTERED—GOVERNMENT REGULATIONS.

Major H L Gallwey, Acting High Commissioner for Southern Nigeria, reporting on the administration of the Protectorate during the year ended 31st March last, says that the general condition of the colony, both as regards finances and the prospects of future development, may be considered very satisfactory. "In a climate like this," he adds, "where for more than half the year any real efforts towards opening up country are defeated by the heavy rains, progress must necessarily be slow, although it is probably very sure. The very low type of native which inhabits the greater part of the Protectorate is also a factor which has to be considered when taking account of the actual progress made. The natives of the Protectorate, without exception, are conservative to a degree, especially among the older chiefs, and it is with the greatest difficulty that improvements of any kind can be introduced amongst them, and the only way by which this has been achieved has been by the use of the greatest patience, energy, and tact. It is needleess to say that from time to time punitive action has had to be taken in order to put down wholesale massacres, cannibalism, and closing of trade routes, but such punitive means are never resorted to unless all efforts of a pacific nature have utterly failed. The factor, the conservatism of the people, must also be considered when the work which has been performed in this Protectorate during the nine years of its existence is looked into. The work of opening up inland from the coast has been slow, and must always be so, for if done in a hurry and with no thought for the welfare and improvement of the people, it would take a very short time for the country to fall back again into its former state." The total trade during the period under review came to £1,614,753 as against £1,507,288 in the previous year. Imports fell off nearly £7,000, but exports moved up over £14,000, so that the net result was a fair increase. The principal commodities sent out are palm kernels and palm oil, but rubber is beginning to take an important place in the list: Last year 1,450,567 lb of the value of £105,117 was exported, as against 874,298 lb of the value of £60,608 in 1898-9, an advance of more than 65 per cent. Very great care is exercised in developing the rubber industry. It is practically under the control of the Forestry Department, which has issued regulations designed to preserve the trees and foster trade. The Forestry Inspector, referring to the way these regulations work, says :—"I endeavoured to make them preventively operative by personally inspecting and assessing the value of rubber forests belonging to nearly 100 Bini towns and villages; by creating, in accordance with the extent of forest staffs, *ex-officio* rubber inspectors in each of them; by instructing the inhabitants of all of them in the only safe regulated way of tapping suited to local circumstances; by explaining in detail the rubber regulations prohibiting tapping during the dry season; and by constituting every Bini an ex-officio policeman to bring to justice any rubber gatherer infringing the regulations. ... ... Fortunately the Binis, whose eyes I have opened on every possible occasion to the value of their rubber forests, responded with alacrity, and today exercise such restraining influence on prohibited rubber-tapping and adulterated rubber-producing that not a single rubber-gatherer is free from close 'shadowing,' and not a single ball of rubber and prohibited root rubber could work its undetected way to Lagos or our own trading factories. Even though gathered out of this Protectorate, it could not work its way down unchallenged, provided t had to pass any portion of the Benin City territories. This is so in every part of the territories—even in the newly-acquired districts stretching eastwards." It is only in the Benin territories that such regulations are in force, as the other rubber forests in the Protectorate lie in those parts where native councils do not exist, and it has not been found possible to enact native laws by which the regulations can there be rendered effective. Major Gallwey thinks it will probably be advisable to issue a proclamation dealing with rubber forests throughout the whole of the colony. Nurseries have been established in some centres, the object being to form plantations close to villages for seed-producing purposes. This will eventually allow every village to collect its own seed in order to sow in the bush at the commencement of the rainy season. It is also interesting to note that, out of an approximate length of roadway in the Benin territories of 450 miles, the Forestry Inspector has planted 250 miles with rubber seed, four deep on each side of the road. Before very long it is not improbable that the Government will establish rubber reservations in different parts of the Protectorate.—*Financial Times.*

A BIG "BASKET."

(To the Editor of the *Pioneer.*)

Sir,—The following record of fish recently killed in the Jumna by Mr. Herbert Vansittart of Goodrich Castle, Dehra. Dun, may prove of interest to your angling readers.

February 19th, morning—1 gonch, lb 40.

" " afternoon—1 gonch, lb 125. (weighed in camp not counting loss of blood.) This enormous fish was hooked about 4 p.m. and landed between 6 and 7, after being first drawn into shallow water, where its backbone was severed with axes. It took four men to carry it to camp. Length, 6 feet, girth round shoulders 40 inches. With this fish, Mr. Vansittart has beaten his previous record for the Dun by 5 lb.

Feb. 20th, Mahseer, 31 lb, 30 lb. 22 lb, 11 lb, 14½ lb, 15½ lb, 23 lb, 18¼ lb, 15 lb and 21st Feb. Mahseer, 38 lb, Gonch, 96 lb.

Feb. 22nd, blank day. Water coloured, unfishable.

" 23rd	Mahseer	lb	44
" 24th	"	"	30½

making a total of lb 553¾ in six days' fishing. The tackle used was ordinary American salmon line, wire trace and treble hook on a fifteen foot bamboo rod. The fish were all taken with dead bait.

H. G. Mainwaring, Colonel.

Meerut, March 7. —*Pioneer*, March 13.

PENSIONS WITH TEA.

COMBINATION OF SHOPPING AND INSURANCE.

Widows, tea merchants, and insurance offices will be interested in a case that is to be heard in the High Court about May.

This is the appeal of Messrs. Thomas Nelson and Co., tea merchants, who were prosecuted for doing assurance business without depositing £20,000 with the Board of Trade, as is required by the Insurance Act. To every widow who has purchased half a pound of their tea every week for a year before

her husband's death Messrs. Nelson promise a pension of 10s a week until death or re-marriage. Widows who have purchased a quarter of a pound of tea instead of half a pound receive 5s a week.

Whatever its legal aspect, the scheme is novel and ingenious. According to Messrs. Nelson and Co., although they only started in January 1898 their yearly turnover has reached £250,000, and their pension-roll £35,000 per annum. The widows' cheques are posted every Friday from the head offices at Louth, in Lincolnshire. Last Friday, when an *Express* representative was invited to see them despatched, in proof that there was no deception, the total was 1,832, and a dozen male and female clerks toiled against time to catch the post.

"How do we make our profit?" said the manager. "By simple arithmetic. Of every hundred women who become regular customers only an average of 1¼ become widows. The remaining 98¾ pay for the pensions of their less fortunate sisters and at the same time provide for themselves and their families, should they in turn lose the bread-winner.

"It pays us better to push our tea in this way than to spend mammoth sums in advertising.

"No, we don't sell cheap tea. We sell the best Indian."

"We claim that this is not only a good business scheme, but a step as well towards the solution of the Old Age Pension Question."—*Daily Express*, Feb. 26.

THE WORLD'S TIMBER SUPPLY.

At the Society of Arts on Wednesday Dr W Schlich read a paper on the "Outlook for the World's Timber Supply." Sir W T Thiselton-Dyer was in the chair.

The first part of the paper was occupied with statistical details on the export and import of timber in the various countries of the world. As regards Europe Dr Schlich reached the conclusion that the present deficiency of 2,620,000 tons was sure to increase because the European sources of supply were not likely to meet the additonal 600,000 required annually; personally he would not be surprised, if ten years hence the deficiency amounted to three or four times the present quantity. Of the importing non-European countries taken altogether there was no doubt the net imports would increase as time went on. Of the exporting countries, the regions round the Caribbean Sea exported mahogany and other furniture woods, but they also imported so much lumber that their net exports were only 13,000 tons a year. The West Coast of Africa exported various hardwoods but they were so expensive that they hardly affected the question. British India could not do more than send some teak and furniture woods. In Asiatic Russia, even supposing there was a surplus of production for export, the cost of transport would be practically prohibitive. The Timbers of Central Africa were not of the sort required in Europe in large quantities, apart from cost of transport, and in South America matters were in a similar position. It would not be possible, he felt sure, for the United States to meet for any length of time the increased demand which they had supplied for the last few years. Their present annual production, estimated at 75 million tons, was exceeded by the present annual consumption by 33 per cent, and this meant that they consumed annually not only the legitimate growth or increment but also a portion of their capital unless decided steps were taken at once to start thorough protection and systematic management on selected areas, or, as they might be called, reserved State forests. There should be no difficulty in permanently reserving 100 million acres, and if half the annual revenue—£700,000—derived from Canadian forests were devoted to that purpose, substantial progress could at once be made to secure not only the present, but an increased, output for any length of time, leading ultimately to a revenue tenfold, or more, the present amount and securing a permanent supply of coniferous and other timber for the world. In the second part of his paper Dr Schlich drew attention to a few lessons that might be learned as regards the British Empire as a whole and these islands in particular. With all the forest wealth of the colonies, we imported into the Empire timber valued at nearly 18 millions sterling every year, and the sum lately had risen at the rate of £771,000 annually. Surely the time had come for a more vigorous forest policy on sensible lines throughout the Empire. Systematic forest management should be introduced, more particularly into Canada and Australia, and, above all, let the self-governing colonies consider a little more seriously than hitherto the magnificent example set by India. But we should begin by putting our own house in order. The imports of timber into the United Kingdom in 1899 were valued at 25 millions sterling, and of late years they had increased at the rate of 332,000 tons, £919,000, annually. Eighty-seven per cent of the total consisted of pine and fir, the sources of which were specially exposed to exhaustion, and where were we to obtain the nine or ten million tons of coniferous timber we required when the countries round the Baltic, and perhaps also Canada, had begun to fail us? Yet we had sufficient, and more, surplus land at home to produce all this timber without putting a single acre out of cultivation. There were 12 million acres of waste land and 13 million acres of mountain and heath land from which to choose the necessary six or seven millions, and surely £25,000,000 going out of the country every year was money enough to take some trouble about.

SIR W T THISELTON-DYER, in opening the short discussion which followed, pointed out that of coal and timber—the two sources for the sustentation of human comfort and industry supplied by solar activity—the former was limited in amount and there was no hope that it could be reproduced, but in the case of the latter nature had a regenerative power, so that, except when the perversity of mankind interfered, one tree when felled was succeeded by another. But there was no question more hard to drive into the head of the administrator or politician than that of afforestation; he was always anxious to reserve it for his successor. Still, a forest service had been established in India, which was an example to civilisation, and more recently others of our dependencies had been induced to do something for their forests. There was, however, no good in being unreasonable in the matter. We were told that we paid 25 millions sterling a year for imported timber, but he personally was not so deeply impressed by this fact as the lecturer seemed to be. We were a business nation, and as such bought in the cheapest markets and he did not think we could be made to grow our own timber merely as a matter of sentiment. He doubted if people in this country would engage in forestry unless they could be convinced of a return of 4 per cent. on their money, and he could not see the way to that at present.—London *Times*, March 1st.

POTATOES IN CHINA.—The Chinese are just taking to the cultivation of the Potato. Though this most indispensable vegetable has been cultivated in England for the last two and a half centuries, it is believed that the Spanish introduced it from Peru in the beginning of the sixteenth century, but it was not till two hundred years later that it came into general use in Germany and France, and even then popular prejudice was so much against it in Prussia, where it was credited with causing leprosy and fevers, that Frederick the Great had to resort to legislation to promote its use.—*The Gardener*, (March.)

TO ALL PARTS OF ASIA, AFRICA, AMERICA AND OCEANIA.

Seeds & Plants of Commercial Products.

Hevea Brasiliensis.—Orders being booked for the coming crop ; August-September delivery, 1901, booking necessary before the end of April, quantities of 100,000 and over at special low rates. Plants available all the year round. 100,000 and over at special low rates. A leading Rubber planter in Sumatra, who purchased 50,000 seeds in 1899, and 100,000 in 1900, writes us, under date 15th November, 1900:—" I received your letter of 20th October, from which I learn that you added another case of 5,000 seeds to replace the loss, &c. I am satisfied hereby, and even after this adding I am satisfied by the whole delivery of this year."

Castilloa Elastica.—True superior variety cultivated in Mexico, seeds from specially reserved old untapped trees. Orders booked for August-September delivery, 1901, booking necessary before the end of March ; large quantities on special terms ; Plants in Wardian cases.

Manihot Glaziovii.—Seeds and Plants available all the year round, 100,000 and over at special low rates. A Mexican planter, in sending an order for this seed, wrote on the 22nd August, 1900:—" If they arrive fresh and germinate easily I may send you larger orders, as they are for high ground where the Castilloa does not thrive."

Kickxia Elastica.—(*Funtumia Elastica*).—Seeds and Plants, orders booked. (Lagos rubber.)

Ficus Elastica.—Seeds available in May-June ; booking necessary before the end of March ; also plants.

Urceola Esculenta and **U. Elastica.**—Same as above. (Burma rubber.)

Parameria Glandulifera.—Orders booked for seeds for January-February delivery ; also plants, immediate booking necessary. (A good rubber creeper of Malacca.)

Landolphia Kirkii.—Seeds in July-August, early booking necessary. Plants can be supplied all the year round. (A highly-recommended species.)

Chonemorpha Macrophylla.—Seeds and Plants ; orders booked. (A very valuable rubber-yielding creeper.)

Memusops Globosa and **Payena Leerii.**—Seeds and plants in July-August, booking necessary before April.

Achras Sapota, Willughbeia Firma, W. Edulis and other **Rubber and Gutta Percha** yielding Trees and Creepers, Seeds and Plants.

Cinnamomum Zeylanicum (Cinnamon superior variety). New crop of seed in April to June, booking necessary before the end of February ; also plants.

Coffea Arabica, Liberian Hybrid and **Maragogopie Hybrid.**—New crop March-April ; immediate booking necessary.

Cinchona Ledgeriana.—Seeds now ready, also other varieties.

Seeds and Plants of Nutmeg, Clove, Sandalwood (white and red), Pepper, Cardamom, Vanilla, Cacao, Tea, Coca, Fibre, Medicinal and Fruit Trees, Shade and Timber Trees, Eucalyptus various varieties, also Palms, Bulbs, Orchids, &c.

Our enlarged Descriptive Price List of Tropical Seeds and Plants of Commercial Products of Foreign countries for 1901-1902, now being prepared, and will be ready in a few months.

" South Africa."—The great authority on South African affairs of 25th March, 1899, says:— " An interesting Catalogue reaches us from the East. It is issued by William Brothers, Tropical Seed Merchants, of Henaratgoda, Ceylon, and schedules all the useful and beautiful plants which will thrive in tropical and semi-tropical regions. We fancy Messrs. Williams should do good business, for now that the great Powers have grabbed all the waste places of the earth, they must turn to and prove that they were worth the grabbling. We recommend the great Powers and Concessionaries under them to go to William Brothers."

Price List of Seeds and Plants for Ceylon use post free on application.

Our new Descriptive Price Lists of Seeds of Shade Trees for Coffee, Cacao, Tea, Cardamoms &c., Timber Trees, Trees for Avenues, Hedges, Wind and Shelter Belts, Ornamental Trees, Shrubs and Climbing Plants ; and Seeds and Plants of Palms, Calamus, Pandanus, Cycads, Tree and other Ferns, Crotons, Orchids, Bulbs, Dracænas, now being prepared, and will be ready shortly.

Special Arrangements made with foreign Governments, Botanical and Agricultural Departments, Planters and others for supplying seeds and plants of Commercial Products in large quantities.

Agents in London:—Messrs. P. W. WOOLLEY & Co., 90, Lower Thames Street.

Agent in Colombo, Ceylon:—E. B. CREASY, Esq.

Telegraphic Address: WILLIAM, VEYANGODA, CEYLON.

Lieber's, A.I. and A.B.C. Codes used,

J. P. WILLIAM & BROTHERS,
Tropical Seed Merchants,
HENARATGODA, CEYLON.

Correspondence.

To the Editor.

A RAILWAY FOR NYASSALAND, B. C. AFRICA.

Jan. 12.

Dear Sir,—I cover latest prospectus for the B.C.A. Railway sent to me by Mr. T H Lloyd. It is supposed by those who know that some London capitalists will be got to take the matter up, and that we will get our Railway soon. The transport difficulties are really serious; goods lie sometimes a year or more at the river terminus for want of carriers to bring them upcountry. —Yours truly,

H. B.

	£
Capital ..	250,000
Permanent way constuction ..	230,000
Rolling stock ..	20,000
Revenue—Freights.	
1. Import, 4,650 tons at £4 ..	18,600
2. Export, 1,250 tons at £2 ..	2,500
Passengers—	
1. Europeans, 400 at £5 ..	2,000
2. Natives, 1,000 at 5s, ..	250
Mails, subsidy ..	200
Passengers' luggage ..	100
	£23,650
Working Expenditure—	
Depreciation, 10 per cent on £20,000	2,000
Insurance fee, 10 per cent on capital	2,500
Wages—	
Superintendent of line, Traffic Manager, 2 accountants, 3 clerks, 4 drivers ..	3,000
Native wages ..	1,000
Fuel—	
20,000 yards at 1s. 3d. ..	1,000
Paints; oils, grease, iron, etc., for repairs to engines, trucks and permanent way ..	1,000
	£10,800

Nett profits—£13,150 on £250,000 = 5·42 per cent.

N.B.—It is to be noted that the statistics of tonnage deals with *dead weight* only, the method in which the road and river dues are collected. The Transport Companies have the option of charging by measurement. This makes a difference in their favour of more than *one-third* in the returns. The Railway Company would have a similar option. Allowing for this we have roughly £23,650 plus £7,000, *i.e.*, £30,650 total receipts, less expenses £10,500. In other words, a profit of £20,150 instead of £13,150 or 8 per cent.

CEYLON COCOA IN LONDON.

Feb. 15.

Dear Sir,—Cacao growers in Ceylon must be struck with the extremely high prices which are being paid for Ceylon cocoa. For several weeks past now, values, particularly for the finest, have been gradually in the upward direction until 108s. 6d per cwt has been realised. In the last sale, we would mention that for our friends we secured the record price of the sale notwithstanding the fact that there was better quality sold at 3s or 4s per cwt. below our price.

Looking into the near future we cannot hold out a very glowing prospect for cocoa; as we cannot but feel that, notwithstanding the fact that, taking Cocoa as a whole, prices are lower than has been the case for some time, yet the position is not altogether the same. There is no getting away from the fact that cocoa production is making rapid strides and at the same time those who are constantly in communication with the leading cocoa manufacturers of the country know that the manufacture of the prepared article also is being greatly pushed and that consumption is going ahead. Supplies are now coming in freely and we fear that for medium and common cocoa, especially common, we shall see lower prices; we should not be, at all surprised to see native Ceylon, which is now in the neighbourhood of 72s, down to 64s or 65s per cwt.

Fine cocoa, as we have said above, will take care of itself; there is a keen demand for the fine pale break Ceylon cocoa. At the sales on the 12th inst., 2,704 bags Ceylon were catalogued. 1,041 bags found buyers, small at 54s 6d to 69s 6d, common to fair dull 66s 6d to 75s, middling to good 78s to 90s 6d, fine 96s to 102s 6d per cwt.—Yours faithfully,

p. p. JOHN HADDON & CO., G. F. A.

DISTRIBUTION OF COCONUT OIL IN 1900:—OSCILLATIONS EXPLAINED.

Dear Sir,—Referring to your article in Saturday evening's *Observer*, the oscillations to which you refer are more easily explained than you appear to think. During the past year the Presidential Elections in America caused the usual disorganisation in trade and were the cause of that country taking less Coconut Oil than usual; but it is not to be supposed that the figures given in the Chamber of Commerce Returns expressed the total quantity of Ceylon Coconut Oil taken by America in 1900. As a matter of fact very large purchases of Ceylon Coconut Oil were made *in London* last year by American buyers who found it cheaper to buy in London than in Colombo!

As regards shipments to the Far East, Singapore has now a large Copra mill of its own, which supplies the demand which Ceylon used to meet. A little Coconut Oil is still shipped to Penang from this port, but not much.

The Indian demand for Coconut Oil is a very steady one, and when the Ceylon exports to India are small it is well-known that Cochin has made up the deficiency. Last year comparatively very little Cochin Oil went to Europe or America, the bulk going to Indian ports, principally Calcutta.

Hoping these explanations may be of some use to you,—Yours truly,

COCONUT OIL.

TEA-PLUCKING AND THE MAKING OF GOOD TEA.

Colombo, March 15.

Dear Sir,—I beg to quote the following extract from Mr. Jas. Sinclair's letter. which appeared in your issue of the 12th inst.:—

"Exorcising from their minds some of the senseless cuckoo cries always rampant in Ceylon, such as 'tea is made in the fields,' which is only the case in the same sense as that porridge is made in the oat-fields.'"

When I was an assistant on a tea estate in Dikoya, my "P.D." always impressed upon me the importance of carefully plucking the tea bushes in order that a good tea might

be made. As this does not seem to agree with Mr. Sinclair's statement, might I ask the favour of your advice on the matter, as I am anxious to know the right course to pursue? Thanking you in anticipation of your reply,—I am, dear sir, yours faitfully,

JOHN F. WILMAN.

[We have no hesitation in saying that, in his justifiable desire to show the importance of greater attention to factory work than has, perhaps, hitherto, been generally shown in Ceylon,—Mr. James Sinclair went too far in minimising the importance of careful work in the field, and more especially in the careful plucking of leaf. For, we suppose, it will be generally admitted that good and fine teas cannot be made by the most careful attention in the factory, if coarse unsuitable leaf only is supplied? Careful plucking, careful withering (for which plenty of room is indispensable) and careful manufacture generally, all undoubtedly go to the turning out of the best tea any particular plantation is capable of; but we see Mr. Mann, the scientific expert for the North Indian planters, declaring that "quality" is most likely to be improved by suitable manures.—ED. *T.A.*]

PEPPER GROWING ON THE ANAIMALAIS.

Pollachi, March 17.

DEAR SIR,—I see in your March number of "*T.A.*" that a correspondent of the *Madras Mail*, writing about these hills—the Anaimalais—says he believes the elevation is too great for pepper to do well at. Can you or any of your experienced readers give me an opinion on this, confirming or refuting the suggestion, as I am now arranging to put down several thousand cuttings?

In my experience in Mysore at this elevation, 3,000—3,500, with the same class of forest, but with twice the rainfall (300 inches), the plant *grew* well and sturdily, fruiting well for a few years and then becoming subject to a blight which materially reduced crops,—too much wet perhaps.—Yours faithfully,

"ANAIMALAIS."

[We have never heard of pepper-growing above 2,500 feet in Ceylon, while the most successful culture in the time of the Dutch was quite in the lowcountry, indeed, at Madampe and Kalutara near the seashore and in the Kegalla and Matara districts a few hundred feet above the sea level. Still, Dr. Thwaites and his successors have cultivated pepper successfully at the Peradeniya Gardens near Kandy, say 1,600 feet elevation; but we should doubt very much the pepper vine fruiting successfully at 3,000 feet or over in Ceylon, and the chance should be less farther north on the Anaimalais or in Mysore?—ED. *T. A.*]

A BIG PYTHON.

Kalutara South, March 24.

DEAR SIR,—I send you measurements below of a Rock Snake (in Sinhalese, "Pimbura") caught yesterday and afterwards killed:

Length while in its natural state		9½ feet
Circumference	... ...	15¾ inches
Stretched out and in motion	...	17½ feet
Circumference	... ...	12 inches

Has this ever been beaten? W. A. L.

[Tennent in his "Natural History" says of the Python:—One that was brought to me tied in this way measured seventeen feet with a proportionate thickness: but one more fully grown, which crossed my path on a coffee estate on the Peacock Mountain at Pussellawa, considerably exceeded these dimensions. Another which I watched in the garden at Elie House, near Colombo, surprised me by the ease with which it erected itself almost perpendicularly in order to scale a wall upwards of ten feet high." —ED. *T.A.*]

BIG PYTHONS.

Galle Face Hotel, Colombo, March 25.

DEAR SIR,—A correspondent in today's issue of the *Observer*, while giving the dimensions of a python killed in Kalutara South, asks:—"Has this ever been beaten?" Some years ago, when a party of planters in the Kalutara district were hunting for red deer, they missed one of their beagles, and, on searching for him, found him enveloped in the folds of a python. The animal was shot; and on being measured found to be 22 feet long and 22 inches in circumference. I had these figures from two of the gentlemen who were present. Natives have got an exaggerated idea of the size to which pythons grow, as the following story shows:—A party of honey-hunters rested to cook their afternoon meal and finding a log convenient sat down upon it, placing two stones to form a fire-place, the log forming the third support. When the meal was nearly cooked, a queer motion was observed in the log, and on examining it closely lo! it was a python. Needless to say the party did not stay to partake of that meal.

W. J.

[Are both stories equally reliable?!—ED. *T. A.*]

ENORMOUS COFFEE CARGO.—The arrival in the port of New York of the Lamport & Holt's Line steamer "Rossetti" with a cargo of 126,000 bags coffee from the port of Santos is quite significant as marking a new era in the coffee-carrying trade. The Lamport & Holt's Line is the oldest established line of steamers in the coffee-carrying business from Brazil to the United States, and this line owns an enormous quantity of tonnage. Going back some twenty, years it was considered quite an event to get a cargo of coffee from Santos in excess of a total of 10,000 bags or from Rio of about 30,000 bags, and in the old days of the Baltimore clippers it was quite a circumstance to have a whole cargo of 12,000 or 15,000 bags of coffee come in here belonging to one firm. The enormous jump during the interval can be understood when we look at the cargo by the "Rossetti" of which nearly 75,000 bags belong to one house in New York, representing a total value of about $750,000.—*Rio News*, Feb. 5.

THE TONACOMBE ESTATES COMPANY OF CEYLON, LIMITED.

THE REPORT.

The following is the report :—

ACREAGE.

The acreage of the Company's Estates is as follows :—

		acres.		acres.
Tea in bearing	..	578		
Tea not in bearing	..	12		
Tea seed bearers	..	3		
				593
Cardamoms in bearing	..		..	101
Reserved Forest	..		..	24
Fuel trees	..		..	20
Chena and Patana	..		..	1,142
		Total ...		1,880

The total quantity of Tea secured dnring the year was 225,178 lb. which has been sold at an average of 38·01 cents per lb. nett as against 42·74 cents per lb. realised last year.

The total Cardamom crop was 10,469 lb. which realised R1·70 per lb. nett as against R1·76 per lb. last year.

The total expenditnre on Working Account amonnted to R65,001·29.

During the year the permanent improvements on Capital Account inclnde the erection of a set of 12 roomy lines.

The balance available, after providing for depreciation amounts to Rs 28,459-05, and the Directors propose to pay a dividend for the year at the rate of 5 per cent, absorbing Rs 14,000; to write off the balance standing to debit of New Clearings Account Rs 5,841·95 and Cart Road Rs 1,061·73= Rs 20,902·68, and to carry forward Rs 7,555·37 to next account.

The Directors have pleasure in reporting that the Debenture debt has been further reduced by £1,000 during the year.

In terms of the bond no further repaymeuts can be insisted on by either party before 30th June, 1902, but the Directors are negotiating with a view to repayment of £1,300 or more on 30th September next on terms which they consider favourable to all interested.

The Coast advances have been still further reduced from Rs 5,125·98 on 31st December, 1899, to Rs 2,955·16 on 31st December, 1900.

The Crops for 1902 are estimated at

230,000 lb Tea
10,000 lb Cardamoms

against an expenditnre of Rs 68,951·93.

During the year Mr R S Templer and Mr G H Alston resigned their seats on the Board, and Mr H Cumberbatch and the Hon'ble Mr W H Figg were appointed in their places.

Of the Direotors Mr H Cumberbatch retires by rotation, bnt is eligible for re-election.

The appointment of an Auditor for the current year will rest with the meeting.

THE UDABAGE COMPANY, LTD.

REPORT :—ACREAGE.

215	acres in full bearing	
84	,,	4 years old
36	,,	3½ ,, ,,
164	,,	2½ ,, ,,
499	acres	cultivated
641	,,	available reserve
1,140	acres more or less	

The Directors beg to submit to the Shareholders the accounts for the year ending 31st December, 1900.

The Crops secured amounted to 157,295 lbs. made Tea against an estimate of 165,000 lbs., and realized R39,769·04, or an average of 25·29 cents per lb. against an expenditure (exclusive of cost of works on capital account) of R40,375·16, or an average cost of 25·67 cents per lb.

The disastrons condition of the Tea Market in the latter part of the year for all low-country production, coupled with the financial embarrssments of the Company, caused by the exhaustion of all available working Capital, has resulted in a serions loss in the season under review, and the Shareholders will be called upon to consider proposals (1) for liquidating the debts of the Company, or (2) a sale of the property, subject to the existing first mortgage debentures amounting to R100,000.

The Directors issue with this Report a scheme advanced by the Agents and Secretaries, for reconstruction of the Company, which will be considered at an Extraordinary General Meeting held immediately after the Annual General Meeting called as above, and all Shareholders are earnestly requested to be present to consider the proposal and decide on the course to be adopted.

The Estimate for the current season is, inclnding 7,500 lbs. of Tea from brought leaf, 232,500 lbs. made Tea.

To complete the extensions deemed necessary in the Factory and supply the required equipment in Machinery for the manufacture of Green Tea, a further expenditure in Capital Account this season will be necessary, but the Directors consider that ample provision will then have been made for the manufacture of 300,000-350,000 lbs. Tea which may be regarded as a maximum Crop from the present cultivated area.

Green Teas.—The necessary machinery has been supplied to the Estate for the manufacture of Green Teas, and if the state of the market warrants their manufacture in preference to Black Teas, they can be produced at a small additional cost. The facilities provided for the manipulation of Green Tea will, the Superintendent estimates, be sufficient to deal with 150,000 lbs. made Tea ont of an anticipated Crop of 232,500 lbs. Samples already reported on and valued by Messrs. Forbes & Walker are eminently satisfactory.

Mr. J P Anderson, the Company's Visiting Agent, reported as follows as to the condition of the property, namely :—" I visited the Estate on the 22nd and 23rd January and found the Estate in excellent order, clean, and all works up to date," from which it will be seen that given the necessary Working Capital it only requires an improvement in the Tea Market to ensure the future success of the Company.

Coast Advances.—Of the amount R26,239·09 shown as ontstanding in the Balance Sheet, the Superintendent reports R10,669·25 as recoverable, R13,969·84 as doubtful, and R1,600 are irrecoverable.

In terms of the Memorandum and Articles of Association of the Company Mr. W Shakspeare retires from the Directorate and does not offer himself for re-election.

The appointment of an Auditor for the current year rests with the Meeting.

THE CEYLON TEA AND COCONUT ESTATES CO., LIMITED.

REPORT OF THE DIRECTORS.

ACREAGE.—*Tea.*—In bearing, 402·1·32 acres; in partial bearing, 8·0·30 acres=410·2·22 acres; coconuts, 559·3·3 acres; cinnamon, 21·2·30 acres; rubber, 35·0·0 acres; grass, forest and chena, 380·2·38 acres; total 1,407·3·13 acres.

The Directors have now to snbmit to the shareholders the accounts for the past year.

Tea Division.—The crop secnred amounted to 132,186 lb. being abont 12,814 lb. nnder the estimate which is accounted for by the extremely bad season, and because at the beginning of the year the tea still suffered to a certain extent from the effects of the attack of Grey Blight referred to in last year's

report, but the Directors are glad to say that the bushes have fully recovered, and are now in a more healthy condition than ever.

The nett average price realized was 30·68 cents, against 36·43 cents in 1899.

Coconut Division.—This crop was 20,884 nuts short of the estimate entirely owing to the unfavourable season. The total crop gathered during 1900 was 579.116 nuts of which 2,118 nuts were sold on the estate at R30 per thousands nuts. The remainder were made into copra—Candies 444·4·0 18 and sold at a nett average of R44·93 per candy, as compared with candies 421·0·2·8 in 1899 which realised an average of R44·20 per candy.

The estimates for this year are: *Tea.* 180,000 lb. against an expenditure on working account of R39,285·75. *Coconuts,*—700,000 nuts on an expenditure of R14,440.

After making the usual provision for depreciation of buildings and machinery, the result of the year's working shows a loss of R9,715·92 as compared with R5,993·30 in 1899.

Mr G H Alston having resigned his seat on the board, the Hon W H Figg was appointed to fill the vacancy. The vacancy caused by the resignation of Mr F Capper was filled by the appointment of Mr H H Capper, and on his subsequent resignation, the Directors appointed Mr F Crosbie Roles to the vacant seat.

In terms of the articles of Association, Mr H Tarrant retires from the board of Directors, but is eligible for re-election.

The appointment of an Auditor for the current year ill rest with the meeting

THE NAHVILLA ESTATE CO., LTD.

REPORT.

The Directors herewith present their Report for the season ended 31st December, 1900, together with a duly audited Statement of Accounts for the same period.

Conditions generally throughout the year were favourable for yield, and the Tea crop amounted to 539,974 lb., against an estimate of 390,000 lb. It is also very largely in excess of the output of last season.

The Coffee crop, nearly all of which came from Nahavilla estate, amounted to 1,176 bushels of parchment, and is about 400 bushels more than had been expected at the beginning of the year.

Tea prices show a falling-off from season 1899, the net average per lb. being 35·42 cts. and 40 cts. respectively, but the cost of producing the crop and placing it on the market has been reduced from 30·32 cts. to 29·42 cts. per lb., including one cent per lb. for manure.

The working is still rather expensive owing to the large acreage of Tea in partial bearing, but further reduction will be possible as these fields reach maturity.

The total profit on the working of the several estates for the year under review is R50,212·61, which, after allowing for interest on mortgages, &c., is equal to about 9 per cent. on the paid-up capital of the Company, a highly satisfactory result, having regard to the fact that Ceylon Teas have receded so much in value of late, and that there is still a large acreage of young Tea (nearly a third) from which little or no leaf has yet been gathered.

The Directors regret, nevertheless, that the financial position of the Company does not in their opinion justify the payment of a dividend, and they recommend therefore that the balance as per Profit and Loss Account, namely R32,914·51, should be carried forward to Extension Account.

Since the Company was formed, a sum of about R250,000 has been spent on improving and developing the estates, with the result that we have now close on 1,500 acres of Tea in place of 837 at starting, and new Factories have been erected on Ury and Nahavilla, which, although fairly complete in themselves, will require some further extensions in the near future as the returns of leaf increase.

This expenditure has been partly met by money raised from time to time on mortgages of the Estates, at reasonable rates of interest, but there is still a considerable sum outstanding, and at the beginning of the year the Shareholders were invited to come forward and assist the Directors in placing the Company on a sound financial basis by subscribing to an issue of Preference Shares, the object being to pay off these mortgages and provide funds for any additonal expenditure that might be required for the completion of the Buildings, and for bringing the young fields of Tea into bearing.

The response to this Circular was not such as to admit of the scheme being put through, and other suggestions for providing the necessary funds having for various reasons also fallen through, the Directors feel that there is now no alternative but to adopt the course they have suggested in respect to the disposal of last year's surplus.

With regard to the future there is more land that could be planted with tea on some of the estates, but all that is at present contemplated is to bring into bearing the fields which have already been opened and improve the Factories on Ury and Nahavilla in such a way as to place the respective Superintendents in a position to do full justice to the requirements of an increasing output of tea.

The expenditure necessary for the above purposes is roughly computed at R30,000, but this does not include the erection of a Factory on Galella which may perhaps be undertaken if funds are available at some future time though not just at present.

As already intimated there is a large acreage of young tea on the Company's estates to come into bearing yet; and the capital cost of the property per acre when fully developed will probably be about R400 on the cultivated area, which is fairly moderate for a good going concern with a large reserve of land and a steadily increasing yield.

We are, however, in need of money, and although the present may not be an opportune time for attempting to provide what is required in this connection and enable the Shareholders to participate in the annual profits, it is hoped that the commercial aspect of Tea may improve in the near future and afford opportunities for putting the affairs of the Company on a good financial footing.

From an agricultural point of view the outlook on the Company's Estates continues satisfactory, the estimates for the new season being 565,000 lb of Tea and 520 bushels Coffee against an expenditure of R162,388, including manure which, however, is to be sparingly used.

ACREAGE.

	Nahavilla.	Ury.	M.P.G.	Galella.	Total.
Tea in full bearing ...	288	309	217	287	1,101
,, partial bearing ...	35	212	35	—	282
,, not in ,, ...	84	16	—	—	100
Coffee ...	78	41	—	—	119
Cardamoms ..	—	15	5	—	20
Forest ..	45	41	—	72	158
Grass, Fuel Trees and Patana ...	71	132	84	254	541
	601	766	341	613	2,321

Mr. E S Grigson retires from the Board of Directors by rotation, and is eligible for re-election.

The appointment of an Auditor rests with the Meeting—By order of the Directors,

GEORGE STEUART & Co.,
Agents and Secretaries,

Colombo, 1st March, 1901.

CLAREMONT ESTATE COMPANY.

REPORT OF THE DIRECTORS.

The Directors submit herewith the accounts for the year ended 31st December, 1900.

The crop secured was 86,374 lb. as against 81,281 lb. in 1899, and the cost of putting it on the market was 24·58 cents, realizing 26·40 cents nett, as against 24·54 and 34·97 cents respectively in 1899.

The estimate of crop for the current year is put down at 95,000 lb. to cost in Colombo 24·08 cents.

Interest on mortgage (£3,000) has been paid to the end of September, 1900, and the next payment will be due on the 31st March, 1901. Interest on the mortgage debentures remains as yet unpaid.

A change of Superintendent was deemed necessary during the year, and the present arrangements are giving satisfaction.

In consequence of the poor results of the year's working, the Directors have written back their fees.

The mortgage of £3,500 was called up during the year. The Directors, however, were able to effect a fresh mortgage of £3,000, and secondary mortgage debentures to the extent of R23,500 were raised to cover the balance of the old mortgage and the amount due to Syndicate appearing in last year's balance sheet.

During the year Mr. J G Russell resigned his seat on the board, and Mr. W P Barber was elected a Director. In terms of the articles of Association Messrs. A. Orchard and R. Huyshe Eliot retire from the office of Directors, but are eligible for re-election.

The appointment of an Auditor for the current year also rests with the meeting.

TEMPLESTOWE ESTATE COMPANY.

THE REPORT

of the Directors was submitted as follows :—

The Directors have the pleasure to submit their report and accounts for the year ending 31st December, 1900.

The crop amounted to 202,405 lb. tea costing about 26¾ cents per pound, and the price realised was about 37 cents per pound, shewing a profit of fully 10 cents per pound, which, in view of the low prices ruling, especially during the latter half of the year, may be considered satisfactory.

An interim dividend of three per cent on the preference shares and two per cent on the ordinary shares was paid in September last, and after allowing for this the amount now available is R11,939·46, which your Directors recommend should be disposed of as follows, viz. :—

	R c.
By the payment of a final Dividend of three per cent on the Preference shares (making six per cent for the year)	3,258 00
By the payment of a final Dividend of two per cent on the Ordinary shares (making four per cent for the year)	3,284 00
By transfer to Depreciation account	3,375 00
By carrying forward the balance of..	2,022 46
	R11,939 46

In terms of the articles of Association, Mr Giles F Walker retires from the Board, but being eligible offers himself for re-election.

It will also be necessary to appoint an Auditor for 1901.

A MALARIAL EXPERIMENT.

The *Indian Medical Gazette* reports that Captain C J Fearnside, I.M.S., of Rajamundry, succeeded in inoculating himself experimentally with malarial fever by means of mosquitoes. On the 17th December, 1900, several anopheles (of a light fawn colour) were fed on the blood of a person known to be affected with spring tertian fever. On the 12th day, 29th December, two of these infected mosquitoes were made to bite Captain Fearnside's arm. The presence of zygotoblasts in thes veneno-salivary glands was verified by microscopic examination. Other infected mosquitoes also bit him on 1st January and 8th January, 1901; on January 12th, 14 days after the first bites by infected mosquitoes, he felt "seedy." His indisposition became more marked and on the 18th he felt distinctly ill. On examination of his blood there were found much pigment in the leucocytes, young spring tertian hæmamœbae and pigmented spheres. The fever lasted all night and he was too ill to work on the 19th. There can be no doubt of the genuineness of this experiment, or that it was produced by the infected mosquitoes. We are glad to state that Captain Fearnside has taken plenty of quinine and is now none the worse for his scientific experiment.

CARDAMON CULTIVATION.

For the three districts—Medamahanuwara, Nitre Cave and Rangalla—we showed 1891 acres in our last Directory as under Cardamoms. A planter, thinking of native gardens, considered we were much below the mark in reference to the first-named district, but referred to a well-known resident as the best authority. This gentleman, on being appealed to, dissented, as we expected, from the larger estimate, and shows that Mr. de Silva's Kandewatte and some of the bigger gardens might aggregate 200 acres apart from very small gardens of other natives. We do not think, therefore, that there can be now more than 3,000 acres under cardamoms in all the three districts, including native gardens. Even at 100 lb. an acre, such an area would yield more than half the total export from Ceylon for last year which was 538.000 lb. Of course, the greater the area already planted, the greater the discouragement to extend cultivation; but Ceylon has nearly got to the end of its suitable land, and it is in India that there is a risk of overdoing cardamoms, as well as tea, unless planters there take warning in time.

COCONUTS IN THE KELANI VALLEY.

We have few regular returns from estates; but we hear generally that a great many tea estates in "the Valley" have fields planted up with coconut palms at 30 to 40 feet apart. This is carried out up to 1,000, 1,300 and even to 1,600 feet above sea-level, and so far the palms flourish. The oldest planting in the district is from 6 to 7 years, so that the time has not come for bearing. Most of the seed nuts have come from Mr. Beven's well-known Franklands property in the Veyangoda district. We do not find fault with—in fact we highly approve of—this plan of having a second product in the Kelani plantations; but at the same time we are quite sure that proprietors should lay to account the getting of smaller returns from the tea when the palms—voracious feeders with wide-spreading roots—come into bearing. At the same time we should expect the crop of nuts to more than compensate for any deficiency in the tea.

INTERESTING NEW TROPICAL PLANTS.

The new orchid, Lœlio-Cattleya, called after the Empress of Russia, is a hybrid between the Cattleya Mendeli and Lœlia Digbyana. A single plant sold in England for £200. It is the result of skilled experiments by Maron, and attracted much attention at the Paris Exhibition.

Another new plant is the red banana with purple foliage, discovered at the Catholic Mission of Brazzaville, and found elsewhere in the French Congo. The fruit is long, without seed, and good for making fritters. The plant is highly ornamental, and is likely to figure in European gardens or conservatories.

Of new flowering shrubs the Rhododendron Halopeanum, a hybrid with rosy white blossoms, is notable, but requires a mild climate like that of South or Central France. The Dahlia "President Viger," produced at the Lyons Botanical Garden, is likely to found a new race.—*Globe*, March 1.

THE ÆRIAL STEEL ROPE TRAMWAY.

ON THE KANAN DEVAN HILLS.

(*Communicated.*)

So many enquiries have been made about the Ropeway recently erected from the Plains to the Kanan Devan Hills Produce Company's property in North Travancore that the following notes are penned in the hope they will interest your readers and answer the enquiries that have been made from time to time.

The first Ropeway line surveyed was about six miles long and the country was very difficult, added to which one span was about 2,700 feet which, as any one acquainted with Ropeways knows, greatly lessens a rope's efficiency because the weight of the rope itself between the standards, 2,700 feet apart, would have been nearly 1½ ton, whereas with the present longest span between of 1,400 feet, the weight of the rope between the standards is about ¾ of a ton and the difference (¾ of a ton) can be carried in line load (*i.e.*, goods) instead of the strength of the installation being expended carrying its own weight. Another disadvantage of this line was that part of it was very flat and part very steep so that there would have been a continual variation of the load on the driving motors when heavy loads left the flatter portions and got on to the steeper ones. The apparent difficulties of this line decided me to try a new trace and it was laid in following pretty closely an old cooly track with the result that we got a line 2·6 miles long at a comparatively even gradient touching a point at the foot of the ghaut to which a railway could conveniently be brought and a point near the top of the ghaut to which a cart road or tramway could be brought and we had then got the skeleton of a complete scheme which has gradually been filled in.

From the end of the old cart road on the plains, a railway trace was laid—10 miles long, 4½ of which ran over the plains and 5½ ran into a narrow valley with grades from one in 80 to one in 25 for the last three miles and curves of 100 feet radius. The bridges are all steel structures running up to 60 feet long and safely capable of carrying narrow-gauge engines and the concession granted by the Indian Government to a Madras Firm (Messrs. Wilson & Co.), for the construction of a narrow gauge railway from Amanayakannur to Utamapalium includes a branch to the foot of the Ropeway. From the top terminus of the Ropeway some 40 miles of cart road and tramways have been cut stretching to Munaar and in various directions therefrom, tapping the Company's estates and factories.

These tramways and roads, the former especially, a Ewing's one-rail tram, may form the subject of a separate monograph ; but for the present we will 'return to our muttons' and deal with

THE ROPEWAY ALONE.

The distance between the upper and lower Termini is 2·6 miles, the difference in elevation 4,000 feet; the steep country is naturally very rough and the lower half a very deadly climate.

The first thing we did was to cut a 5-feet bridle path approximately along the Rope line to transport the material for the Ropeway construction along. Estimates were called for from the most eminent English and local Ropeway Engineers, but not one would undertake *its erection in this deadly ghaut* (which showed their wisdom, as events proved) and an offer was made to the Directors to design, construct and erect the Ropeway locally if they would not hold the worker responsible for any failure, and if they would not protect themselves by engaging a competent Consulting Engineer, and to this they agreed, and the work was placed in the hands of Mr. W Kemlo, whose great ability and training under Lord Kelvin marked him out for the task. One of first difficulties was how to drive the horse-power to be provided (and in this connection the difference in horse-power considered necessary by two great Ropeway Firms was very striking). Another point to be decided was the form of Ropeway, whether of the fixed Rope type, or a moving rope carrying its own loads. After great consideration it was decided that the latter form would be the more suitable, *provided grips could be designed* which would be effective on such a steep Ropeway. Believing that *we* could design what was wanted the plans were prepared.

In order to keep the driving station in as healthy a point as practicable we put it half way up the rope, and divided the Ropeway into two halves at this point, the reasons for the latter being: (1) that if a breakdown occured at any time on one half of the rope, the other one half could still go on working and, (secondly) had the whole 2·6 miles of Ropeway running down 4,000 feet vertical been in one piece, the wear on the rope at the upper end and on the gear there, due to the weight of the rope itself, would have been very excessive.

The next point we decided on was the driving arrangements and as at a convenient point we were able to get in Beeton wheels, having a vertical fall of water operating them of over 700 feet and developing 100 H.P., we fixed this as the Power Station and transmitted the power through a 28 E.H.P. Dynamo one mile over a thin cable to the Centre Station where the motor in its turn operates the Ropeway. By actual results the whole Ropeway requires only about 20 H.P. to drive it, full of loads, at two miles an hour, but of course the power required is greatly regulated by the amount of *up or down loads* at any given time. The dynamo is capable of driving it fully loaded on the *up going side only* at two miles an hour. To save risks of accident we put in duplicated peltons, dynamos and motors.

The erection of the 1,500 feet of pipe and the 1,500 feet of spouting in the watercourse as well as the Peltons was slow and expensive and was done by Mr Kemlo's brother. The country is very rugged, and deadly unhealthy, and the spouting as well as much of the pipe had to be carried on iron supports and there were two bridges made for the spouting, one 80 feet long. The Ropewire is ⅞ inch diameter best plow steel and was brought out in eight pieces, each 3,000 to 4,000 feet long, wound on a drum. These were all bored for the same axle and the rolls of wire hauled along the track by block and tackle till they came into the Ropeway line where the wheels were fixed and the rope hauled out, the drum revolving on the axle. This was a very neat locally designed arrangement, made at home, and worked perfectly.

Everything comes to him who waits and; after much sickness and great trouble, we got the rope up and splices all completed and

PREPARED TO MAKE A START

when the starting resistance sent specially by the providers of the dynamo fused and we had a grand example of pantomime magnesium lights. Part of the current went through Mr Kemlo's thumb and the place smelt of beefsteaks, while the natives went over that ghaut like another flash.

Mr. Kemlo designed and made with native carpenters a salt and water resistance Box which is working very well and cost a few rupees and that difficulty was got over and the rope started.

You can imagine our disgust and annoyance when we found the rope grips supplied from home so badly made that they would not work, and we had to have new jaws made locally in brass which although not sufficiently strong have worked well and now new jaws of annealed steel are being put in and are working very perfectly.

These jaws, which are the secret of the Rope's success, I will describe later when a patent has been granted. Suffice it to say that they automatically grip the rope at any point desired, go up to the top, and automatically leave the rope and run on to the rail. The pulleys on the standard heads have such deep grooves that the rope cannot get off by any chance and the result of this combination of essential points is that the life of the Rope itself is greatly prolonged and probably more than doubled, while accidents have been reduced till, I believe, 8,000 loads passed over the rope before the last accident, due to a defective pulley and not in any way connected with the grips, and it really did not do any damage to speak of.

The Ropeway *running at half speed two miles an hour* is fully loaded with 66 grips which with loss of time loading and unloading do three rounds a day. Each load should be two cwts. and this equals 40 tons of out and in traffic a day and assuming that it worked only 250 days in the year this equals 10,000 tons of traffic which is far more than sufficient for present purposes. When it is worked up to 10,000 tons it will certainly show a profit of £10,000 as compared with what it would have cost to move this weight up and down the ghaut by cattle and ponies and donkeys of which we had about 3,000 at work, when the writer came out three years ago. So I think the most captious critic will admit that it is a magnificent success. The greatest credit is due to Mr W Kemlo who has designed and had constructed every detail of it from beginning to finish and to his Assistant.

The automatic working of the Ropeway is very attractive and everyone who has seen it says he or she would not have missed the sight for a good deal. L. DAVIDSON.

ABYSSINIAN COFFEE.

A British consular report from Harrar, printed in the London *Grocer*, says: "The Harrar coffee is of a very good quality, known in the London market as 'Moka long berry;' where it is preferred to the real Moka. Occasionally its price in London is higher than that of Moka. Plantations of coffee are increasing slowly, because the natives prefer to cultivate the Kiatt (*Celastrus edulis*) as more lucrative, one pound of leaves of which are sold for $1 and sometimes $2; the natives, as in Arabia, eating these leaves. Nevertheless, more than 150,000 coffee trees have recently been planted, especially in the districts of Chercher and Itto. The Abyssinian coffee is wild and grows in Kaffa (whence the name), Limmu, Gimma, Gumma, Ghera, Ennarea, and Hillu. It has a very good aroma, and if cultivated it would be a very keen competitor of the real Moka. Monseigneur Massaya (afterwards Cardinal), when Bishop of the Gallas some forty-five years ago, cultivated in Ennarea 3,000 trees and obtained a quality much superior to the real Moka, both in flavour and aroma. This coffee used to be imported here from the above countries *via* Addis Abiba, and exported to Europe after being cleaned in Aden. In the European market it is known as Abyssinian coffee, but, on account of the present low prices of American coffee, the export of this coffee is decreasing. Most of the import is stocked in Harrar, and now the imports from the interior are next to nothing, the price, $4 per farasla, not covering the expenses of transport from the above-named countries. Should the American crop fail, the increase of export of Abyssinian coffee would recommence. On representations made by the merchants of Harrar, the Emperor Menelik has abolished the export duty of 8 per cent on Abyssinian coffee this year.—*Rio News*, Feb. 5.

PLANTING NOTES.

COFFEE IN VENEZUELA.—Coffee planters in Venezuela are lamenting the condition of the coffee trade. In a memorial from the Caracas Chamber of Commerce to the President of Venezuela, the text of which has been brought by the mail, it is urged that the condition of the coffee trade has been for some time lamentable, owing to the steady fall in price, through well-known causes, and that the measures which the present Government have just taken have aggravated this position, by putting on the highest tariff, which will cause the trade to lose the French market, where hitherto the greater part of the Venezuelan crop has been sold. The abolition of the Venezuelan export duty on coffee is recommended. The duty amounts to 3 bolivars 22 centimes per quintal.—*Home and Colonial Mail*, March 8.

NILGIRIS GAME AND FISH PRESERVATION SOCIETY.—Further interesting particulars of the work of this active society, in which Ceylon Fishing Club and Game Protection members will doubtless be interested, appear elsewhere. But the reference to Ceylon, as being troubled with rabbits, shows curious ignorance. There is an agitation, we see, for an increased gun license. Elsewhere we have also quoted Mr. F L Mitchell's most recent letter (from Singapore) regarding the introduction of trout into Kashmir.

ROYAL BOTANIC GARDENS.

EXTRACTS FROM THE REPORT OF THE DIRECTOR FOR 1900.

1.—Changes and Movements in the Staff.

The Director was absent in India on privilege leave from December 6 to the end of the year, during which period Mr. J. B. Carruthers acted as Director. The staff has been enlarged during the year by the appointment of Mr. Carruthers as Assistant Director and Mycologist, and by the retention of Mr. M. Kelway Bamber as Chemist, paid by fees for work done for the Department up to a guaranteed amount of at least Rs. 3,000 per year. Mr. Carruthers entered upon his duties on March 30, but was absent on leave from April 16 to May 24, owing to the results of a serious accident. Mr. Bamber's duties were begun on July 1. Under the vote for Skilled Assistance the services of Mr. H. Wright have been obtained from June 28. In the early part of the year this vote was partly expended in the salary of Arunar Chinnappu, who was employed as tobacco curer in the experiments in progress.

On April 11 the late Head Clerk, Mr. J. Ferdinandus, died in Colombo; he had served efficiently from 1894, and his loss was much felt. He was succeeded on June 1 by Mr. R. H. Pereira, of the Colonial Secretary's Office, formerly employed in this Department.

2.—General.

The past year has been marked by a considerable increase in the sphere of activity of the Department, which enters upon the new century with an increased scientific staff and equipment. The permanent staff now includes the Director, who also acts as the Botanist; the Mycologist, who attends to all questions of diseases of plants other than those due to insects; the Entomologist, who attends to all questions of economic entomology; and the Chemist, who attends to questions of analysis of soils, economic products, &c. There is also the temporary Assistant, who devotes himself to the detailed study of some one particular question.

The new Laboratory was completed and handed over by the Public Works Department in February, but there was a considerable delay in the completion of the furniture, and it was not till the end of the year that it was really ready for work. The equipment of the Laboratory with apparatus will be gradual, but it already contains a good supply of all the ordinary utensils, chemicals, &c., required for scientific work. Since its completion the building has been largely used, and has proved very convenient and well arranged in most respects. A number of botanists from abroad are now working here, and a noteworthy and gratifying feature is the large number of visitors who have been sent officially by various Governments during the year to study the organization and working of the Department.

The Mycologist and Entomologist have carried out a great deal of work during the year, and their departments are becoming gradually organized on the lines which experience shows to be most useful. The bulk of their time is of course taken up with researches into the nature and life history of the numerous insects and fungi which are or may become of importance with regard to agriculture, but they have also travelled through many districts of the Island to investigate diseases and to give advice and assistance in dealing with their attacks. One method employed with some success has been for one of them to attend a meeting of the local Planters' Association in a given district, and there to discuss particular diseases and the modes of dealing with them, subsequently visiting selected estates to give practical instructions and to study the diseases more in detail. Such work is at present considerably handicapped by the extreme reluctance of cultivators to say or do anything that may seem to confess the presence of disease among their crops, but as time goes on the advantages of taking early advice and action will become more evident, and this source of difficulty and friction be lessened. Detailed reports of both officers are given as appendices.

The organization of a department to deal with prevention of disease is a new and a very important, though perhaps a less showy, line of work than that of the introduction of new industries. The losses caused by disease are enormous, and to save even 5 per cent. of them is a great gain.

The establishment of other industries has, however, not been lost sight of. The Botanist and the recently appointed Chemist have devoted much attention during the year to camphor, which seems, owing to the action of the Government of Japan, likely to prove worth cultivation in Ceylon. They have also commenced a detailed investigation into the chemistry and botany of the citronella and tobacco industries, with a view to discovering what improvements are possible that may avert the threatened danger of collapse from overproduction and foreign competition. Further details are given below.

The office and clerical work of the Department has increased very much during the year. The correspondence with planters and others on diseases, modes of cultivation, &c., is rapidly increasing, and takes up a very large part of the time of the scientific staff. It is hoped to relieve this pressure during the next year by the publication of more frequent circulars, &c., which may be distributed instead of letters in answer to many of the most frequently recurring questions. A lithographic press has been recently obtained, and it is intended in future to illustrate the circulars, a proceeding which should add to their usefulness. Their circulation continues to increase, and they seem to meet with approval from the agricultural public.

The Library has been much improved during the year. The catalogue has been completed and sent to press, and will appear early in 1901. The offices of the clerks have been moved from their former inconvenient position near the Curator's office to two small rooms at the back of the Museum, and thus close to the Director's office. Office space is needed for the Entomologist and Mycologist, and can be provided at a very small cost by the alteration of two of the rooms under the Library, at present only available as godowns on account of their want of windows.

In the Botanic Gardens themselves there is little to chronicle of special importance. Their general condition has been steadily improved. Many new plants have been introduced, and the buildings, conservatories, &c., have been put into better repair. In the two chief gardens and at Badulla the general condition of the plants is good, the buildings, &c., in good repair, and the work of the staff is efficiently carried on. The other gardens are not at present in a satisfactory state, and will be overhauled during 1901.

The experimental plots of economic and useful plants have been extended as much as possible during the year, but the space at our command is too small to allow of really satisfactory experimental cultivation.

A reorganization of the gardening and subordinate staff was proposed and sanctioned during the year (see Sessional Paper XVI. of 1900), and will be gradually put into operation as vacancies occur. An incremental scheme has been adopted, and the prospects of the officers concerned improved. Two posts, those of Assistant Plant Collector and Kankani, will be abolished, and three new ones, those of Herbarium Assistant, Clerk to the Curator, and Sixth Gardener, created. The total cost under the new scheme will remain as before. The total cost of the Department, including special votes, has been Rs. 71,740, against Rs. 58,822 last year. The increase is due to the salaries of the Mycologist and Entomologist, and the retaining fee to the Chemist, with the slight increases in the other votes rendered necessary by the increase of the staff. The receipts from sales have been Rs. 4,658·52, against Rs. 6,114·41; the decrease is due to the lower price of rubber seed.

3.—Notes on Economic and other Plants.

Tea.—The past year has been one of depression for the industry. The export has risen in an unprecedented and unexpected manner to 148,431,639 lb. against 129,894,156 lb. in 1899. Fortunately the export to Russia, now one of the largest consumers of Ceylon tea, has risen to 8,917,185 lb., an increase of 5 millions over 1899, and the exports to Australia and America show increases of 2 million lb. and 1 million respectively, while there has also been an increased export to France and other European countries. Nevertheless, so great has been the increase in production that 10 million lb. more than in 1899 have been sent to the markets of Great Britain, an increase of 10 per cent., which has been accompanied by a decrease of 10 per cent. in the average price (7·20*d.* as against 7·96*d.* in the preceding year). The rise in the duty from 4*d.* to 6*d.* per lb. has also helped to depress prices, especially of the lower grade teas. As the extension of cultivation, though practically over in Ceylon, is still going on in South India, Java, and elsewhere, it is probable that the full effect of overproduction has yet to be felt, and that the tea industry has now to pass through a trying period, which may lead to considerable alterations and reorganizations in methods of working, &c. Greater specialization, larger factories under specially trained managers, manuring and plucking for quality rather than for quantity, selection of the best and most suitable jâts as regards quality of tea and power of resisting disease, replacement of inferior bushes and fields by better and by other products, careful precautions against disease, and improvements in methods of cultivation and manufacture, are some of the directions in which relief may be looked for.

Tea has been comparatively free from serious outbreaks of blights during the year (see supplements).

A commencement, which may lead to important developments, has been made in the manufacture of green teas suited to the American markets. If this extend, it will temporarily relieve the overproduction difficulty.

An important paper on Ceylon Tea Soils and their influence on the quantity of tea has been published by Mr. Bamber during the year.

Coffee.—The rise in the exports during 1899 was a mere temporary one, and in 1900 the total export was only 10,777 cwt. as against 18,542. This is the lowest figure that has been reached since the beginning of the decline in the industry.

Cacao.—The Assistant Director, who now takes charge of all matters connected with this product, reports as follows :—

> The exports for 1900 show a considerable decrease, from 42,745 cwt. to 33,476. This, however, may be explained in a variety of ways. The year from January 1 to December 31 is not the best period for a record of cacao yield, and it is probable that the pickings of the last few weeks of the year and of the first weeks of 1901 will to some extent make up the deficiency, the crop in 1900 having been later than usual. That the canker of stem and pod and the attacks of Helopeltis, &c., are a factor in lessening the yield, is no doubt true, but a large diminution in fruit crop has occurred in trees which have no disease. In fact an unusual number of dull and rainy days in some cacao districts has told against the production of fruit and in favour of the blackening of pods and the growth of canker.
>
> The prices which have been obtained for Ceylon cacaos show that the quality of our cacaos is still up to a high level, and encourage cultivators to devote attention to further improvements of their methods of curing.
>
> The canker and blackening of pods still causes a serious diminution of crop on many estates where little or no care is taken to combat these evils, but where preventive and curative treatment is thoroughly carried out a marked decrease has resulted, and in some cases estates which two or three years ago were seriously handicapped have been almost entirely freed from the disease. Local attacks of Helopeltis on the pods have been more virulent than usual. The cacao industry will, however, be benefited by these evils to some extent, as they have undoubtedly led to more sanitary methods of cultivation, and such advances, as well as efforts to improve our varieties by selection and other means, tend to an increase of profit from this fruit tree, which grows vigorously in different climates in Ceylon.

Cardamoms.—The export rose from 499,959 to 537,455 lb., a slightly larger figure than in 1897, hitherto the largest recorded. Extension of cultivation continues both here and in South India, and the price shows signs of a considerable fall in the not very distant future.

Cinnamon.—The export of both bales and chips has risen, the former from 2,515,031 lb. to 2,678,111, the latter from 1,829,127 lb. to 1,863,406. The export of the "wild cinnamon" mentioned in last year's report has enormously decreased, to 43,339 lb. bales and 105,914 lb. chips. The price of this material has fallen very low. The export of oil has also fallen largely, from 118,778 to 72,904 oz.

Cocoanuts.—Extension of cultivation continues, and there has been a great rise in the export figures for all the various products of this palm, which has now become a very large staple. The export of oil has risen from 400,979 cwt. to 443,959, of copra from 325,401 cwt. to 362,467, of desiccated cocoanut from 13,571,084 lb. to 13,604,913, of poonac from 174,786 cwt. to 185,992, of nuts from 11,723,392 to 14,995,909, of coir rope from 12,090 to 12,572 cwt., of coir yarn from 75,525 to 87,415 cwt., and of coir fibre from 91,588 to 115,090 cwt. The industry seems in a prosperous condition, and the trees are on the whole remarkably free from any serious disease, considering how long they have been cultivated in the Island.

Other Palms.—The export of palmirah and kitul fibres has risen, though not to the figures of 1898. The sago palm continues to do well at Peradeniya, and should be tried in swampy places in the low-country, where it might prove a valuable source of food for local consumption, if not for export.

Indiarubber.—Extension of cultivation of both Hevea and Castilloa continues in favourable localities, and very good valuations have been received of rubber sent home from certain estates. The demand for seed has been less than last year, and the supply much larger. A very large quantity of seed has been exported from Ceylon to Burmah and the Straits, where Hevea cultivation is now becoming an important industry. Very favourable reports have been received from Europe on samples prepared in the Botanic Gardens by Mr. Parkin's methods, and it is hoped during 1901 to test these on a commercial scale with certain modifications that have been found beneficial.

Guttapercha.—There has been no demand for this during the year, and it is doubtful if it will ever be taken up by private planters.

Fibre.—There has been a small demand for sisal hemp and other fibre plants, but there seems no prospect at present of any one seriously engaging in the cultivation of any new fibres in Ceylon. The palm fibres have been mentioned above.

Cinchona.—The Assistant Director reports as follows:—

> The export shows a further decrease, being 510,462 lb., against 618,921 lb. last year. There has been an increased demand for information relating to the various hybrids and the conditions of successful cultivation, and an unusually large amount of seed has been purchased (chiefly abroad) and planted during the year. Specimens of various kinds of barks from different localities in Ceylon were obtained, and these will be worked out in Europe by M. Reimers, who is devoting himself to the study of chemical and botanical questions in cinchona.

Camphor.—This product has come much into prominence during the year as a possible paying adjunct to tea in many districts. The bulk of the world's supply at present comes from Formosa, and a monopoly has now been established by the Government of Japan, resulting in a rise and a steadying of the price of crude camphor, which is now from 185 to 200 shillings per cwt. At this price there seems a fair prospect of a paying return, now that it is certain that camphor can be distilled from the leaves and twigs of quite young trees. It must, however, be remembered that what can be done here can also be done in Japan, and probably at least as cheaply. The plant succeeds well in many districts of Ceylon, from sea-level to 6,000 feet; its cultivation is easy, and there is no great difficulty or expense involved in cropping and distillation. A series of distillation experiments have been carried on by the Chemist in the latter part of the year, with varying but fairly promising results. When completed, a circular will be published giving all details as to planting, harvesting, distillation, &c.

Tobacco.—Much attention has been given to this product also in the past year, but the problems in hand will require many years for solution. While at present this industry is fairly prosperous and profitable, there is great risk of overproduction when the new railway and irrigation works come into operation and the Vanni country, which contains much land suited to tobacco, is opened up. The market for Ceylon tobacco is confined to Ceylon and parts of South India, and may easily be flooded. With the aid of the Chemist and of native cultivators and others experiments have been begun to test the qualities of our tobaccos and the soils on which they grow, and to see whether Ceylon (like South India) cannot grow something marketable in Europe, thus enlarging the demand and enabling more land to be profitably opened. That Ceylon should grow first-rate cigar or wrapper tobaccos is unlikely, but there seems no reason why it should not produce a good filler, which may be wrapped in Sumatra or Borneo leaf. The seeds of Cuban and other tobaccos distributed last year to native growers in the Northern Province and elsewhere mostly cropped fairly well, though in the Peradeniya Gardens and in the Central Province they were almost completely destroyed by a grub described in the Entomologist's report. The crop, however, was not appreciated for the local market, as it was lighter and less pungent than the coarse native kinds. Probably for the formation of an export trade in tobacco some form between the two will prove best suited for cultivation.

Oils.—Cinnamon and cocoanut oils have been mentioned above. There has been a decrease in the export of citronella oil from 1,478,756 lb. in 1899 (the largest recorded) to 1,409,058 lb. The price of this product, in consequence of overproduction, adulteration, and foreign competition, continues to fall, and is now barely remunerative, and the industry, one of the most important minor ones in the Island, is in a depressed state. The plumbago "boom" took away many of the workers for some time, but this is now over. The Java planters have lately embarked in this industry, and by careful selection and distillation have begun to place upon the market an oil which is far superior to the Ceylon oil, and which fetches a much higher price. This will lead to a further fall in the price of the Ceylon oil unless new markets can be opened, which seems unlikely, or the quality of the oil improved. With this in view the Director and Chemist have made during the year a thorough investigation upon the spot into the industry, and a full report will be published during 1901. The general condition of the industry affords a striking parallel to that of tea, but is distinctly worse.

Fruit.—The supply of fruit plants has been kept up as well as possible to meet the increasing demand for them. This demand, however, is merely for planting round bungalows, and there has been little or no planting on any large scale. Interesting notes on certain fruits will be found in the reports of the two principal gardens.

Fodders.—*Trifolium Johnsonii*, mentioned in last year's report, has now proved a complete failure at Hakgala.

Trees.—Notes on a few on trial at Hakgala will be found in the report of the Superintendent. A detailed study of the Ceylon species of Diospyros and their timbers (ebony, calamander, &c.) has been undertaken by Mr. Wright, whose report is given below.

Ornamental Plants.—Cannas have continued in great request, and are now a conspicuous feature in most Ceylon gardens. Other ornamental plants are also in demand, and the interest in horticulture in the Island seems increasing.

JOHN C. WILLIS,
Director.

Peradeniya, January 25, 1901.

SUPPLEMENTS.

1.—REPORT OF GOVERNMENT MYCOLOGIST AND ASSISTANT DIRECTOR.

DURING the six or seven months that I have been engaged with the work of my appointment nearly 200 inquiries have been dealt with, chiefly dealing with diseases of economic plants. The unusual number of dull days with a humid atmosphere has been most favourable to the growth and spread of parasitic fungi during last year.

Both in the field and laboratory the fungus causing grey blight, *Pestalozzia Guepini*, Desm., has received a great deal of my attention. In order that the life-history of a fungus may be known it is necessary to make cultivations from the spores and continuously watch the growth of the organism with the microscope. These cultures are, as a rule, grown on a gelatinous medium, or some substance favourable to rapid growth; unfortunately the behaviour of the fungus in this artificial cultivation is often quite different from when it is grown in nature in living tissue.

The spores and living mycelium of Pestalozzia and several other parasitic fungi have been cultivated and examined in this manner in the laboratory, and, with the object of making observations and experiments on the fungus as it grows on the tea leaf, ten healthy bushes from two to five years old were transplanted to an experimental bed outside the laboratory. These were carefully removed without much injury to their root system, and have all continued to grow vigorously. With the help of these experimental bushes and material in the laboratory, it is hoped to work out the complete life-history of Pestalozzia and other parasitic fungi on tea.

A series of experiments has been planned and will shortly be established with a view to obtaining a more exact knowledge of the distribution of spores of grey blight and other leaf disease fungi.

Six stations have been selected at elevations of 50, 1,600, 2,500, 3,000, 4,000, and 5,000 feet respectively. At these places a jute hessian screen or tabernacle open at the top, 9 feet high, 45 feet long, and 8 feet wide, enclosing two rows of 15 tea bushes—*i.e.*, 100th part of an acre—and placed at right angles to the prevalent winds, will be erected.

The bushes inside this enclosure will be pruned (at the same time as the rest of the field) and all leaves taken off the bushes and swept out of the enclosure. Much interesting information should be gained by observation of the conditions as regards "grey blight" and other parasitic fungi of the enclosed bushes and those outside on either side of the tabernacle.

In order to test the practicability of taking off all diseased leaves from tea bushes an experiment was carried out at an estate of 4,000 feet elevation. The bushes first selected had gone 12 months from pruning; they were big healthy bushes with little, if any, disease apparent. All leaves with any spot due to fungus or insect were taken off, as it is impossible to instruct coolies as to any special blight. A quick "podian" plucked the leaves, and was closely watched to see that no leaves with any spot were left. The time taken was nearly 6 minutes per bush, or 10 bushes per hour, and about 60 leaves were taken from each bush. Ten weeks later these bushes were examined and only three leaves were found on 15 bushes with "grey blight," and a few with insect injuries. The surrounding tea was, however, not attacked to any extent. A second series of bushes in a field which had gone 22 months from pruning were treated in the same way; the bushes were healthy, but the leaves were spotted, and a large quantity of dead leaves were on the ground. In this case the time taken was 41 minutes to a bush, and nearly 3,000 leaves were plucked from each bush; in some cases 90 per cent. of the leaves were taken off.

It appears from this trial that such measures to prevent the spread of leaf blights when adopted should be taken as soon as possible after pruning, when the number of spotted leaves is few; and no doubt the most economic and most effectual method will be found to carry out this treatment periodically with the plucking by making the pluckers take off all diseased leaves.

If this were generally done, an immense decrease in the amount of "grey blight" in the Island would no doubt result. It is, however, the lack of co-operation in these sanitary matters that vitiates the good work done by the few.

Though the climatic conditions have not been at all unfavourable to the growth of fungi, yet the amount of grey blight on growing tea has not increased, and in many localities has lessened to a considerable extent. This may be to some extent explained by the measures taken by not a few in burning or burying with lime diseased leaves and so destroying vast quantities of spores, and also to the close pruning of some large areas of badly affected tea.

A less encouraging circumstance with regard to "grey blight" is that I have found it on the leaf stalk as well as on the leaf. Specimens of such diseased stalks have been collected and sent to me from various localities, and on them the fungus and its characteristic spores were abundant.

This calls for careful observation on the part of planters, as it is most important that any such attack should be at once stopped by pruning back the bushes below the browned and diseased parts and carefully burning the prunings. The chief reason why "grey blight" has not done more harm to tea is that, as a rule, it only attacks the leaf, and when the diseased leaves fall the bush is free from disease ; were it to spread to the permanent portions of the plant it would become a more serious enemy. It will be of advantage if any planter finding the leaf stalks discoloured, and suspecting this to be due to grey blight, will at once forward specimens for determination.

Another leaf fungus, *Cladosporium herbarum*, Pers., was found on the leaves of tea bushes among which Liberian coffee was growing. I observed on the coffee leaves (which were also attacked by *Hemileia vastatrix*, Berk.), a disease which produced the concentrically marked grey patches associated with grey blight. On examination this proved to be due to another fungus, the Cladosporium mentioned above, and on investigating similar patches on the leaves of neighbouring tea bushes this same fungus was found. *Cladosporium herbarium* is a common fungus on dead plant tissues, but also occurs as a parasite on the living leaves of many plants ; it is recorded on such varying hosts as wheat, peas, apple, raspberry, cycads, agave, and pine seedlings. It has a greenish grey septate mycelium and oval conidiospores.

A report was sent on a leaf disease on tea which is common both here and in Indian tea districts. It is caused by a lichen, *Cephaleurous mycoidea*, Karsten, which produces characteristic reddish and white or grey spots on the leaf ; it is partially parasitic, but it does very little harm and can spread only very slowly, and is consequently not a matter for such serious attention as a fungus parasite.

A root disease of tea has been investigated in regard to its habits and the best methods of combating it. It is caused by a fungus, *Rosellinia radiciperda*, Massee, and most frequently found in clearings where the stumps of jungle trees are left, more especially those with soft wood, but any decaying wood under ground either of stem or root, if the soil is in a moist condition, may be the harbourer of this fungus. It has been found in Ceylon on stumps of various jungle trees, buried logs, stakes put in beside young plants, and buried prunings ; from these it frequently spreads to and invades the roots of living tea bushes, and when it has once attacked a tea bush it gradually decreases the vigour of the plant, and in the end, as a rule, kills it. It can be recognized by its white felty mycelium, which forms strands as thick as or thicker than a piece of cotton, and runs underground from one host to another.

The fruit—which is not so commonly found underground, but can be seen on pieces of wood which have been on the surface after it has been permeated by the fungus for some time—is black and consists of numerous globose bodies.

The best preventive means against the spreading of this root enemy—as indeed against many other root parasites—are to take out the dead or dying bush, burn the roots, thoroughly lime the hole, also to cut a trench not less than two feet deep round the bushes affected, not only round the dead one, but those neighbouring which may be attacked in a less degree, in order to isolate the patch from the rest of the tea bushes. Lime forked in the infected patch will often kill the mycelium and save some of the other bushes. The trenches also have the effect, if properly cut, of draining the place and so removing the conditions which favour the progress of the fungus.

This disease is fairly common in various districts, in some cases three or four supplies in succession having been killed where the new plant has been put in without taking out the old roots. It, however, is generally very local in its effects and rarely occurs where the soil is thoroughly drained. In fields where it is found it is inadvisable to bury any prunings until the disease is entirely eradicated.

An experiment with regard to the treatment of isolation and liming the infected area was carried out on an up-country estate with encouraging results. A trench two feet deep and one foot wide was cut round a patch on which one bush had been killed by the attacks of Rosellinia and some

others were "shuck"; the space inside was heavily limed, slanting holes being made with an alavanga and lime put in. By this means lime can be introduced more intimately round the roots than by surface liming or forking. No bushes have died or appear to be affected without the trench, and some of the bushes inside are recovering.

The question of the effect of Lichens on the stems of tea bushes was inquired about and attention given to it. In the first place, *Physcia speciosa*, Fr., a lichen with a leaden blue coloured flattish thallus bearing on the under surface black hairs, was observed. This lichen is found on exposed branches and stems not protected from the sun and rain, and thus is commonest on the less vigorous bushes. It is not parasitic on the living tissues of the tea plant, and can be cultivated on glass or stone, if suitable conditions are obtained. It gets its nourishment independently of the plant on the surface of which it lives, it does not prevent leafbuds from being formed, and it is probable that its habit of growing on exposed older portions of stem and branches has originated the belief that to its effects are due the lack of vigour of the bush on which it is seen. Some of the less conspicuous lichens which lie closer to the bark will be investigated and the results mentioned in a future report. That lichens and other epiphytes are a sign that the best conditions for the tea are not present is in most cases true, but their removal at more or less cost does not take away the reason for any lack of vigour in the bushes on which they grow.

Several inquiries relating to cacao canker, *Nectria* sp., both on stem and pods, have been received and advised on. In more than one case it has been sent as an entirely new disease which has not been noticed or heard of by the cultivator before. The life-history of the canker having been worked out and the methods of counteracting its evil effects having been laid down, and during the last two years carried out with a large amount of success, it is most important that all growers of cacao, either European or native, should be on the constant lookout to detect the first appearance of this fungus and take steps to get rid of it before any serious loss has accrued and its removal becomes a more difficult and costly matter. Their neglect is also a serious injury to other cacao planters. Other work in regard to cacao is mentioned later.

In connection with the investigation of Pestalozzia, the leaves of some thirty or forty different jungle and garden plants attacked by fungi have been examined, but in no case have the spores of Pestalozzia been found, though in all cases badly "grey-blighted" tea was near or around the plants searched. The injuries which in most cases by their similarity in appearance—to the naked eye—with grey blight being due to other causes, it is important, from an economic point of view, that any invasion of another plant other than tea by the Pestalozzia should be noted and measures taken to prevent increasing the amount of the disease. Seedlings have been submitted suffering from "damping," a disease caused by a fungus, *Pythium De Baryanum*, Hesse, which spreads with great rapidity through a bed, generally so damaging the young plants at the "collar" that they fall down. It, as a rule, implies that the seed bed is too damp, and where it is noticed all dying and dead seedlings should be taken out of the bed immediately. Before the bed is again used it should be sterilised by thoroughly baking all the soil, either by burning bushwood above it or by heating it piecemeal over a fire on a shovel, in order to kill the spores of this and other fungi which grow with great vigour and rapidity in the soft tissues of seedlings.

In sending diseased plants or parts of diseased plants for diagnosis it is important that the specimens sent should show as far as possible the different stages of the disease and not only the last stage when the plant is killed; also that the conditions and environment of the plants diseased should be given and any special circumstances which may have affected them.

All diseases of plants are the effect of a conjunction of many factors, and the most essential and prominent factor is called the cause, as in the case of parasitic fungi. It is often not sufficient to know only one of the factors causing the lack of health; we must know what other conditions are concerned in the effect produced.

The work of a pathologist and therapeutist is to learn all about the life-history and habits of a fungus or other organism which has an injurious effect on a plant, and by studying the relationship between it and its host and the conditions and environment which encourage it, to discover at what time and by what means the prosperity of the parasite can be most easily interfered with.

A good many matters relative to the cultivation of cacao and its improvement have been investigated and are still being worked out. Two of the most striking things in the cultivated varieties of cacao are the amount of blossom produced in relation to the fruit ripened and the number of small fruits, from half an inch to four inches long, which die off without being attacked by any specific disease.

In some cases the weight per tree of these withered fruits has been found equal to ten to twelve ripe pods. This waste energy is clearly a disadvantage to the attainment of greatest profitable yield in a cacao tree.

The fertilization and subsequent ripening of the fruit in cacao is therefore a most important question. The method of pollination is not thoroughly known, and with this in view the flower is being studied ; when the method of pollination is discovered some experiments will be initiated to endeavour to produce an increased fertilization.

A cacao tree has been under observation at Keenakelle, Badulla, elevation 3,800 ft., of the Caracas variety, but not very typical—probably a hybrid—which has for the last five years borne on average of 434 harvested ripe pods per annum. The tree is about 17 years old, $22\frac{1}{2}$ feet high, with a spread of 30 feet, and an abnormally abundant leaf production.

The propagation of cuttings from this tree has been tried, but so far without success, and a series of experiments as to the best method of striking cacao cuttings is in progress. However, any experiments in this direction by planters or others which add to our knowledge will be welcomed, as the ability to perpetuate the characters of any specially fruitful tree would be of great economic importance.

198 seeds from eight pods on this tree were sown in an experimental plot. Each seed was weighed, and those above the average weight (3·4 grammes) were placed in one-half of the plot, and those below the weight in the other half. The plots were further divided into beds according to the pods from which the seeds came, the shape, size, weight, and thickness of wall of the pods being recorded. By this means data will be gained which will show the best directions in which to work in selecting cacao fruits for seed.

For the same reasons a large number of cacao pods have been examined, measured, and weighed to find out what relation, if any, there exists between the size and shape of the pod and the number and weight of the seeds it contains. So far as the investigation has gone no such relationship has been found to be constant, the size of the pod in many cases being simply due to a thickening of the fruit wall, and in many cases the largest pods contain fewer seeds than are found in smaller fruits, but a definite conclusion cannot be formed until a much larger number of different pods have been so examined.

Experiments as to the fermentation of cacao seeds before drying have been made with a view to finding whether the process can be accelerated with good results, and these will be carried on as far as possible.

I have visited various planting districts to make observations and collect information and material for laboratory research, and have attended several meetings of District Planters' Associations, where matters of scientific and economic interest have been discussed and explanations given of certain technical points.

J. B. CARRUTHERS,
Government Mycologist and Assistant Director.

2.—REPORT OF THE ENTOMOLOGIST.

THE following circulars have been issued from the Entomological Department during the year:—

No. 17.—Tea Mites and some suggested Experimental Work against them.
No. 18 (Supplement).—Insect Pests attacking Timber and Shade Trees in Ceylon.
No. 19.—Some Caterpillar Pests of the Tea Plant.

CORRESPONDENCE.—485 letters on entomological subjects were received and filed, and close upon 600 letters on similar subjects were despatched from the Department.

OFFICIAL TOURS AND ENTOMOLOGICAL VISITS.

A tour through the Badulla and Passara districts and across country to Batticaloa was undertaken in April, occupying sixteen days. The main object of the tour was to study a caterpillar pest that was seriously affecting the cocoanut palms in the neighbourhood of Batticaloa. On badly attacked estates the fronds of the palms were being completely skeletonized. A few trees are killed outright; but this is exceptional. I was informed that they usually recover from the attack, but that their bearing capacity is seriously diminished for several years. It was found, as expected, that the properties that were suffering most severely were those on which no efforts had been made to check the pest, or on which unsuitable methods had been employed. On estates where prompt and intelligent action had been taken from the commencement of the attack, comparatively little damage was incurred. The only course to adopt is to watch for the earliest signs of the pest, which are quite easily detected, and immediately to cut off and burn the affected fronds. It is useless to wait until the leaves have been killed before removing them. By that time the caterpillars will have deserted such fronds and migrated to fresh ones. The insect responsible for all this damage is the caterpillar of a small moth belonging to the family *Gelechiidæ*. The species appears

to be undescribed, but specimens have been sent to England for determination. The caterpillar may be recognized by the black head and second segment, the hinder parts being of a pale yellowish tint. It conceals itself beneath galleries composed of silk and sawdust-like pellets of excrementitious matter. The resulting moth is of a pale gray colour with minute black specks on the front wings. It measures about one inch in expanse.

A short visit was paid to Kurunegala in September. This was partly to visit a cacao estate suffering from an attack of *Thrips*, an account of which insect is given below; and partly to examine the feverish parts of the locality in connection with the Mosquito-malaria Theory. Though, from the shortness of the time at my disposal, the larvæ of Anopheles (the particular genus of mosquito associated with this disease) were actually captured in only one pool, I satisfied myself that the available breeding places of the insect were practically unlimited, and that it would be quite hopeless to attempt to exterminate the mosquito by either obliterating or chemically treating the Anopheles pools. The large extents of paddy fields alone would be sufficient to keep up the supply of mosquitoes. I am of opinion that preventive measures—*i.e.*, protection against the actual bite of the mosquito, coupled with the removal of the principal source of infection by the enforced medical treatment of every case of malarial fever, is the only rational course of action. The Mosquito-malaria question is discussed more fully elsewhere in my report.

A third tour, occupying one week early in November, was made in the Kelani Valley district. Many tea estates were visited, a meeting of the local branch of the Planters' Association was attended, and advice was given to the planters with reference to *Helopeltis* and other insect pests.

The past year has not been marked by any very startling outbreak of insect pests, though many cases of more or less serious injury, due to insect agency, have been observed and recorded.

The following are some of the principal species that have attracted attention :—

Heterusia cingala, Moore.—The caterpillars of this moth, locally known as "Red Slug," were prevalent in the Lunugala district in April, where a considerable acreage of tea was completely defoliated. Fortunately the damage was of a temporary nature. The caterpillars were collected and destroyed in large numbers, and in some cases the fields were heavily pruned and the prunings burned. Similar damage was reported from Rangalla in June. During my tour in the Kelani Valley district the caterpillars were observed very commonly on the tea, though no serious injury had been noticed there. It is, however, a dangerous insect to neglect, and whenever the caterpillar is seen search should be made for the rest of the brood.

The "Croton Caterpillar" (*Amyna selenampha*, Guen.)—Croton oil plants in both the Matale and Peradeniya districts suffered rather severely from this caterpillar, repeated broods following each other in rapid succession, devouring the fresh foliage as fast as it was produced. In Matale the principal attacks were in the months of January and June, while a fresh outbreak was reported in December. The pest was observed in Peradeniya in July, only after it had reached its crisis. Experiments were conducted with insecticides, some of the trees being sprayed with Macdougall's insecticide wash, and others with a preparation of arsenate of copper sold under the name of "green arsenoid." It was noticed that the former, applied in the proportion of 1 pound to 4 gallons of water, caused the almost immediate death of the caterpillars ; but experiments with the arsenoid, which acts through the alimentary system, were negative, being vitiated by the fact that the caterpillars were already dying off from a bacterial disease. The pest did not reappear on this plot of croton trees.

"*Nettle Grubs.*"—Several species of these stinging caterpillars have been noticeable during the year. The species responsible for most damage appears to have been *Natada nararia*, Moore, which was very destructive to tea in the Passara district early in the year. Over 100 acres of tea on one estate were completely defoliated, and hundreds of coolies were employed in collecting and destroying the insects.

The larvæ of *Thosea cana*, Walker, were received from Elpitiya ; *Thosea recta*, Hampson, from Morowak korale and Yatiyantota ; and *Spatulifimbria castaneiceps*, Hampson, from several parts of the Kelani Valley. The first three species have been fully described in my circular on "Some Caterpillar Pests of the Tea Plant." The fourth has only recently attracted attention as a tea pest. It is a small and inconspicuous grub, of a chocolate brown colour, with a reddish saddle-shaped mark on the middle of the back and a few yellow spots. Though belonging to the family of "nettle grubs," this particular species is unprovided with the usual urticating spines. The cocoon is very small, broadly oval, smooth and compact. The male moth is uniform dark purplish brown, with indistinct darker transverse bars across the fore wings, the expanded wings measuring just half an inch. The female moth is rather larger, measuring three quarters of an inch across the wings, and is of a much paler shade of brown.

If left to their own devices, any of these caterpillars may suddenly appear in such numbers as to prove a serious pest. The only safe way to treat them is to take them in time, which is when

they first appear. If the earlier broods are systematically collected and destroyed, no further trouble will be experienced.

When visiting in the Kelani Valley recently, I was informed that crows were very active agents in destroying "nettle grubs." During a bad attack of the pest the crows were said to have gorged themselves with the caterpillars until they could scarcely rise from the ground. They should be encouraged in every way.

Dichocrosis punctiferalis, Guen.—The "Cocoa-pod Borer," which is the caterpillar of the Pyralid moth, *D. punctiferalis*, was troublesome in the Kandy district in March. The local treatment, which appears to be very successful, is to employ a force of small boys to examine the growing fruit. Whenever signs of the borer are observed, a few drops of kerosine oil are run into the tunnel of the insect, when the little grub immediately wriggles out and is captured. When the hole does not penetrate into the seed cavity, the application does not injure the pod.

"*Tobacco Pest*."—What may prove to be a rather serious pest has destroyed all the young tobacco plants in the experimental plots in the Peradeniya Gardens. The disease is characterized by a swollen condition of the stem, producing very much the appearance of a half-grown knol-kohl plant. On cutting open this swollen part the tunnels of a small caterpillar are found. Eventually decomposition is set up, and the plant rots away. Specimens of the caterpillars, kept in captivity, turned into minute brown Tineid moths, examples of which have been forwarded to England for determination. The pest was noticed this year only in Peradeniya, but a Tamil cultivator from Jaffna reports that the same disease is known in the north of the Island. The only possible treatment is the immediate removal and destruction of the affected plants. On inquiry from the Botanic Gardens, Buitenzorg, Java, I am informed that an identical or closely related disease occurs on the tobacco plant there. This disease is there locally known by the name of "dikbuikziekte," which may be literally translated as the "paunch-belly sickness," a highly descriptive name.

The "Tea Tortrix," *Capua coffearia*, Nietner, still gives occasional trouble upcountry. This pest has been fully dealt with in the Royal Botanic Garden Circular No. 19.

Boarmia bhurmitra, Walker.—A case of rather extensive injury caused by caterpillars of this moth affords an interesting instance of how a hitherto obscure insect may suddenly assert itself as a dangerous pest. The caterpillar belongs to the family *Geometridæ*, many of which assume, when at rest, the appearance of a piece of dead stick. The species is by no means uncommon, but, until this last year, has not gained any notoriety as an enemy to cultivated plants. It has, however, quite recently appeared in immense numbers on a few estates in the Kandy District, and, after defoliating the Grevillea trees, has attacked the tea. When full grown, the caterpillar buries itself in the ground and turns into a smooth reddish chrysalis. The moth is of a dull brown colour, very finely mottled with darker specks, and is difficult to distinguish when resting on a rock or tree trunk, though, when found, it is easily captured, as it seldom attempts to fly away. The coolies soon become adept at seeing and catching them. On one estate it was estimated that over 50,000 had been killed in this manner. At the time of my visit the caterpillars were dying off from some fungal disease. It was noticeable that there were few birds on these particular estates. Where there are abundant small birds they would be most valuable asistants in checking the increase of the pest.

"*Cardamom Borer*" (*Dichocrosis evaxalis*, Walker).—The larvae of a Pyralid moth, *D. evaxalis*, have been troublesome in parts of the Matale and Rangala districts. The caterpillar tunnels into the mature stems of cardamom plants, making its entrance at one side and boring either upwards or downwards, eating the pith and causing the death of those particular stems. After the caterpillar has vacated them the tunnels often become tenanted by ants, the presence of which first attracts the attention of the superintendent, who, not unnaturally, attributes the damage to the ants themselves. The presence of the borer may be detected by the accumulation of pellets of excrement at the base of the injured stems. The affected stems should be at once cut and destroyed.

Nepita conferta, Walker.—In August immense numbers of the small hairy caterpillars of this moth were invading the bungalows, swarming upon every rock and piece of brickwork, and wandering over the roads and garden paths. This insect is not mentioned here on account of any damage attributable to it, for, with the exception of inconvenience caused by its occasionally coming in accidental contact with one's person and leaving its irritating hairs in one's skin, it is quite harmless. The caterpillar feeds only upon minute lichens and algæ growing on rocks and stones, and will not touch any of the higher plants. But the appearance of such thousands of caterpillars often causes unnecessary alarm to those who do not know the habits of the insect.

Agrotis C-nigrum, Linn.—The sudden appearance of the caterpillar of this moth on a young tea clearing in Bogawantalawa is another instance of the unexpected increase of an insect hitherto considered somewhat of a rarity in Ceylon. The attack seems to have been only temporary, the pest disappearing almost as suddenly as it arrived.

The "Mango Pyral" (*Orthaza euadrusalis*, Walker).—It is a by no means uncommon thing to find the foliage on one side of a mango tree completely destroyed, the leaves withered and riddled with holes and matted together with web. I have recently ascertained that the insect responsible for this damage is the caterpillar of a pyralid moth, *Orthaza euadrusalis*.

Helopeltis Antonii, Signoret.—This well-known insect, sometimes called "Mosquito Blight" from a fancied resemblance to the common mosquito, has been a source of considerable annoyance to both tea and cacao planters. On tea estates in the Kelani Valley and Kalutara Districts the pest annually causes an enormous loss of flush. This may possibly be considered a not unmixed evil by those who are now advocating a reduction of our outturn of made tea; but as the loss falls very unevenly, it can scarcely be considered a beneficial insect. Although the knowledge of the breeding habits of the insect enables us to attack it at its most vulnerable stage, much yet remains to be discovered of its life-history. The most pressing problem is, What becomes of the insect during the months when it deserts the tea plant? It is only careful observation at a number of different stations that can give us any clue to the solution of this mystery. A circular is now being prepared, setting forth what is known about *Helopeltis* and what remains to be discovered.

The *Helopeltis* insect attacks the cacao plant in a different manner. Though there is occasional injury from the puncturing of the young cacao leaves, the principal damage is confined to the pods, which are often so badly punctured when quite young that they are unable to develop properly, or may even be killed outright. I have suggested the spraying of the young pods, at the time when the eggs of the insect are being deposited, with Macdougall's solution or some similar insecticide. This treatment is now being carried out on a few estates with apparently good effects.

Thrips.—A serious attack of Thrips was reported from Kurunegala District in September. The species appear to be the same as has been recorded from the tea plant, but in this case it was injuring cacao trees. I made a personal visit to the estate in question, and found the damage had been really severe. The insect is a most minute one, only just visible to the naked eye. But the work of myriads of individuals results in an excessive loss of leaf and endangers the safety of the crop. The symptoms of attack are a yellowish blotchy appearance of the upper surface and a brownish discolouration on the under surface, which is also covered with small black spots due to the deposition of the excreta of the insect. No eggs could be found; but on crushing the body of the female insect and examining it with the microscope a powerful serrate ovipositor is noticeable, which suggests a probability of the eggs being embedded in the tissues of the plant. It is probable that they are deposited in the younger leaves after these have attained their full size, but before they have become hard. On such leaves the adult insects are found, but few, if any, of the immature individuals. The actual injury to the leaf occurs after it has reached maturity. It was most noticeable that plants growing under dense shade were less affected by the pest than those in more exposed situations. It was also apparent that hardy hybrids, when once they have reached the fruiting stage, are able to withstand the attack very much better than do the old red varieties. The young hybrid plants do not share this immunity, and often succumb to a bad attack. On this account, although it would be quite impracticable to treat a large area with many trees over 20 feet high, attention may be given to the supplies with great benefit, to enable them to reach the immune stage. Such supplies might be sprayed with any of the soapy insecticides in the market. It may be necessary to repeat the treatment at intervals during the critical period.

A case of death from the sting of the common hornet, *Vespa cincta*, Fabr., has been brought to my notice. It appears that a cooly boy, aged about twenty, disturbed a hornet's nest while pruning a tea bush. He was badly stung at 3 P.M., and died before midnight.

A case of bite from the so-called "Tarantula spider," *Poecilotheria subfusca*, occurred in the gardens. The man had been struck in the foot and appeared to be suffering considerable pain. I could find no definite wound. Six days later he was still laid up and was complaining of pain in both arms and legs. His eyes were affected, the surrounding parts swollen. On the day after the bite he was unable to see clearly, but this symptom was slowly passing off. There was no local suppuration or inflammation.

Mosquitoes and Malaria.—So much attention has recently been drawn to the connection between malaria and mosquitoes, and the question is of such importance, that a few remarks on the subject may not be out of place here. Whatever the opinion may be as to whether it is the sole cause, I believe that no one who has investigated the evidence fails to acknowledge that the mosquito (or rather one particular genus of mosquitoes) is a material cause of infection. If we believe that the mosquito plays its part in the dissemination of the disease, we must also recognize the importance of offensive and defensive action against the insect that carries the germs that induce malarial fever. Offensive action is practicable only under favourable conditions. In some towns and situations, where the nature of the land allows of free drainage, or where there is little surface water, it may be

quite possible to exterminate the malarial mosquito by depriving it of its only breeding grounds. But such conditions are seldom found in Ceylon.

Defensive action, on the other hand, is always possible. The malarial mosquito (*Anopheles* species) flies only after sundown. It seldom flies high above the ground. Mosquito netting and upstair bungalows will be the logical policy to meet these two cases. There is of course a period, between sundown and bedtime, when—unless we have made our houses mosquito proof—we are unprotected by mosquito netting. During the evening the feet and ankles are particularly liable to attack. To guard against this it may be suggested that boots might be worn in the evening instead of shoes. The after-dinner nap is another dangerous time, when the mosquito can take his fill without interference. It would be easy to fit up a small mosquito-proof retreat in the verandah of most bungalows, large enough to contain a small table and a couple of chairs, where it would be possible to read (or sleep) in safety and comfort. Those who (like myself) have satisfied themselves of the accuracy of the facts recorded by recent distinguished investigators, that the Anopheles is the sole carrier of infection, and that the malaria parasite cannot exist outside the body of either the man or the mosquito, recognize the importance of isolating and medically treating every single case of malarial fever, and of so preventing the mosquito from acquiring fresh infection, for, unless the Anopheles has previously drawn a supply of the malarial parasite from some fever-stricken patient, its bite is quite harmless. Natives who have to sleep in malarious localities may protect themselves by covering the exposed parts of the body with oil.

In connection with the Mosquito-malaria Theory, the British Museum authorities have called for specimens of all the different species of mosquitoes to be found in various parts of the world. I have sent to England, for determination, some fifteen distinct species, and I understand that other collections have been made and forwarded by members of the Medical Service.

Besides the danger of malarial infection from the bites of Anopheles, the discomfort and irritation caused by the bites of the ordinary species of Culex are not to be disregarded. These species can find convenient breeding places in any chance accumulations of water about a bungalow. Tubs of water should not be allowed to stand undisturbed, or will soon become filled with the small wriggling larvæ of the mosquitoes. Water standing in the saucers of flower pots, in any discarded cans or tins or broken bottles, will also serve to increase the number of insects. All such receptacles should be repeatedly emptied. Another prolific source of mosquitoes is to be found in the hollows of the bamboo stumps after the stems have been cut down. I have recently made a careful examination of the giant bamboo clumps in the Botanic Gardens, and have estimated the number of mosquito larvæ existing in the stumps at any one time. The result of my calculations worked out at the enormous figure of 57,000 larvæ within the area of the Peradeniya Gardens. The larval and pupal stages of the insect occupy from ten to fifteen days according to temperature. Allowing for two generations only per month, for the eight months during which water is likely to remain in the bamboo stumps, we must multiply the above figure by sixteen, producing the total of 912,000 (close on one million) mosquitoes raised from these bamboo clumps in one year. To the above must be added the number breeding in the stumps of the common yellow bamboo, which remains to be estimated. This vast swarm of mosquitoes may (and in future will) be prevented by the simple expedient of trimming off the bamboo stumps to the next knot and leaving no receptacle for the accumulation of water.

Beneficial Insects.—I regret to have to report the final loss of the small colony of imported ladybirds that has been cultivated for the last three years. These beetles were received from the Cape, where the species (*Exochomus nigromaculatus*) is said to be most useful in checking some of the local scale insects. But it is apparently unsuited to our work in Ceylon. It does not breed sufficiently rapidly, and in fact ceased to breed at all after the first eighteen or twenty months. The adult beetles remained alive for a surprising length of time, but died off one by one until the colony became extinct. The several lots of beetles liberated from time to time have shown no signs of having established themselves, and have presumably acted in the same way as those kept in captivity. This failure does not necessarily mean that the introduction of beneficial insects to fight existing insect enemies is useless. It only means that we have not yet introduced the right kind of insect for our purpose.

I have been experimenting on the introduction of the cochineal insect (*Coccus cacti*) and the lac insect (*Tachardia lacca*). Through the kindness of Mr. Lounsbury, Government Entomologist at Cape Town, I have received living colonies of the cochineal insect, and have found no difficulty in establishing them on plants of both *Opuntia Coccinellifera* and *O. Dillenii*. Similar attempts to procure living colonies of the lac insect from India have so far failed. Through the courtesy of Dr. George Watt, I have received repeated consignments of the insects from various districts, but in each case the young larvæ have died in transit.

There has been some correspondence between the Ceylon Government and a company desirous of starting Sericulture in Ceylon. It is unfortunate that the negotiations broke down. If once properly started, this industry would be of great benefit to the native population. The rearing of silkworms is a work which the Sinhalese would soon learn, and which could be carried on in addition to their usual occupations, the cocoons being sold to central factories.

Experiments in the destruction of termites (white ants) by the use of bisulphide of carbon have been conducted with considerable success. But the very limited supply of the chemical obtainable in Ceylon has prevented the continuation of the trials. Three main shafts of a large ant-hill were plugged with the bisulphide, about half a pound in all being used, and all the openings closed with clay. Twelve hours later the nest was opened. A few living insects were observed close to the surface, but lower down the slaughter had been immense. All the comb-like material was blocked with corpses. Unfortunately the queen cell could not be found, so it is uncertain whether that most important individual was killed or not. Even if the poisonous gas failed to reach her, she would probably soon perish for want of attendance, and the mass of putrifying bodies would further poison the air in the lower chambers. The few individuals observed at the top of the nest were doubtless some that had been foraging at the time of treatment and had since returned. I feel satisfied that, if the bisulphide could be obtained cheaply in the Island, it would prove a most valuable agent in checking the ravages of white ants.

Insecticides.—The difficulty of obtaining stock insecticides at prices that will allow of their being freely used has greatly interfered with the treatment of many insect pests. I have now made arrangements with a firm in Colombo to import and stock such articles as may be recommended for the purpose.

E. ERNEST GREEN,
Government Entomologist.

3.—REPORT OF THE SCIENTIFIC ASSISTANT.

I ARRIVED on the 28th June, 1900, and since that time have been engaged in an investigation of the floral and vegetative characters of the genus Diospyros. If time permits, the inquiry will be extended to the members of the other genus—Maba—of the Ceylon Ebenaceæ.

The rarity of flowers and the occurrence of coloured woods (ebony, calamander, &c.) in the genus Diospyros had led to some confusion, and it is hoped that the present investigation will lead to a better understanding of the specific characters of the members included under this head. Hitherto my work has been confined to collecting the vegetative organs and to an analysis of the anatomical features of the seedlings and timbers yielded by the various species of this genus. Evidence has been obtained to show that in the details of the anatomy and disposition of the conducting tissues of the seedlings, specific characters are presented, and these will be used for purposes of classification as is now done in other natural orders by modern systematists.

In studying the development of seedlings of calamander (*Diospyros quæsita*, Thw.), observations have been made which indicate one of the causes threatening the extinction of this valuable timber tree, and these, together with remedial suggestions, will be subsequently published. In analysing the black and variously mottled timbers obtained from these plants, the cause of discolouration has been determined, and experiments have been initiated with the object of inducing a blackening of the timber in the peripheral sapwood.

In consequence of the slow rate of growth and evergreen nature of these trees, it is difficult to obtain an intelligible interpretation of their age, and experiments have been organized at Hakgala, Badulla, Anuradhapura, and Peradeniya, which will assist us in our efforts to obtain a correct elucidation of the seasonal anatomical peculiarities of these and other tropical timbers. In these experiments upwards of 300 observations are being taken every month, and by this means we shall be able to determine what tissues have been formed during any particular period. These facts will then be correlated with the general behaviour of the plants and the climatic conditions under which they are growing. When the flowering period arrives a thorough re-investigation into the morphology of the reproductive organs will be undertaken and correlated with the timber yield of each species. As there is so much doubt in this direction an organized system of collecting will probably be instituted.

The Forest Department of Ceylon has generously forwarded new and rare specimens, and the officials of the Botanic Gardens at Sibpur, Madras, Saharanpur, Singapore, and Mauritius have likewise given every assistance.

H. WRIGHT.

4.—LABORATORY, MUSEUM, HERBARIUM.

The new Laboratory was completed on February 24, but owing to difficulty in obtaining teak the furniture was not ready till nearly the end of the year, and work was carried on with many inconvenient makeshifts. In addition to the regular workers (Director, Mycologist, Entomologist, Assistant), the following visitors have used the Laboratory during the year:—Dr. Preyer of Berlin, January 1 to 19; Mr. R. H. Yapp of Cambridge, February 1 to 15; Dr. Giesenhagen, Lecturer in the University of Munich, March 8 to 30; Dr. W. H. Lang, Lecturer in the University of Glasgow, August 6 to November 24; Mr. A. G. Tansley, Assistant Professor in University College, London, October 1 to November 24; Dr. C. Holtermann, Lecturer in the University of Berlin, November 29 to December 31. The Director was engaged in various economic studies, and in completing the monograph of the Podostemaceæ (a short tour in Western India was made in the latter part of the year to obtain material for this work and to visit the gardens, &c., of Bombay, Poona, Madras, Ootacamund, privilege leave being granted for the purpose). The work done by the other members of the staff is described in their reports. Dr. Preyer was engaged in the study of certain problems in economic botany, especially cacao and indiarubber; the other workers were occupied with investigations into the anatomy, morphology, and physiology of plants.

The fifth and last volume of the Flora of Ceylon appeared early in the year, written by the veteran botanist, Sir J. D. Hooker. The Colony now possesses perhaps the best existing Colonial Flora. At the same time, this flora is anything but complete; there are yet many new species to be discovered, and many occur in other localities than those mentioned. For the filling up of the gaps we must rely largely on the help of local botanists, and an attempt will shortly be made to interest more of the public than have hitherto cared for such things in the study of this most fascinating of the sciences. Suggestions to this end will be cordially welcomed.

Conifers or Fir Trees.—It is interesting to note that several species of these, chiefly Australian, find here congenial conditions for growth, some of them (the *Araucarias* and *Agathis*) attaining to a great height. The site set specially apart for this order on the highest elevation in the gardens has been laid out to better effect, the number of species being also added to.

Cultivation and Experiments.—It has been found necessary to propagate and maintain an unusually large stock of young plants of fruit, shade, and windbelt trees in order to meet the increased demand for such caused by the recent publication of Circulars on these subjects.

Efforts which at present promise some success have been made to graft the mangosteen (*Garcinia Mangostana*) on the Cochin goraka (*Garcinia Xanthochymus*), a species of quicker growth and easy cultivation.

Partly successful attempts have been made to raise nutmeg plants by layering. This will be of importance if found generally practicable, as the nutmeg tree being unisexual the risk of too many male trees occurring in a plantation made from seedling plants may thus be avoided.

A new kitchen garden, for the purpose of testing the suitability of native and exotic vegetables to local conditions, has been made behind the Palmirah avenue, where it does not mar the view.

A beginning has been made in getting together a collection of all the principal varieties of plantains (bananas) growing in Ceylon, with a view of making the best kinds better known and discarding the worthless ones. Upwards of 23 varieties have so far been obtained.

The mango trees received as grafted plants from Poona in 1884 have not as yet fruited, though some have flowered irregularly since the last seven years. One cause of this is probably that they were too thickly planted (15 by 15 feet). Early in the year some of the trees were cut down with a view of inducing the remainder (10) to come into bearing. Of the latter, some were trenched round then at a distance of 7 feet from the trunk, others supplied with about 12 lb. of salt forked in with the soil round the tree, while the rest were "thrashed" by means of a long bamboo, which acted as a severe form of pruning. These are treatments which are said to be effectual in other countries, but as yet unsuccessful here, though it may yet be too early to expect good results.

In regard to experiments in vegetable or fruit cultivation it may be mentioned that possibly the greatest drawback here is the daring pilfering habits of the natives. For example, sets of selected yams were stolen from the ground after being planted out with particular care for experimental purposes.

The introduction of special varieties of tobacco, referred to in last year's report, has not proved a success. Plots were prepared in different parts of the garden, and the seedlings planted out as soon as strong enough and the weather suitable, viz., in the beginning of April. Shortly after, however, these began to show a swelling of the stem at the ground surface, this being the result of a grub which embedded itself in the young stem and gradually ate away the heart of the plant. Only a few of the plants survived, and these were preserved for seed purposes, a few plots being again planted out with their offspring, which so far have not been similarly attacked.

I would point out, however, that circumstances do not favour such large experiments being carried on within the gardens, and that their undertaking can only be incomplete and at the expense of other important matters.

The Brazil-nut tree (*Bertholletia excelsa*) of Brazil, introduced in 1880; *Pangium edule*, a Java tree with large edible fruits, introduced in 1891; and *Dimorphandra Wora*, a tree of British Guiana with enormously large and edible seed, introduced in 1881, have each produced fruit here during the year for the first time; whilst at Henaratgoda station a tree of the Sugar palm (*Arenga saccharifera*) of the Malay Archipelago has borne (for the first time in Ceylon as far as I can learn) a large quantity of fertile seeds, from which a stock has been raised. Among others which have flowered and fruited for the first time here are *Joannesia princeps*, *Sideroxylon dulcificum*, *Diplothemum maritimum*, *Pritchardia grandis*, *Euryale ferox*, and *Enterolobium cyclocarpum*. The following have flowered only for the first time:—*Acalypha Sanderiana*, *Allamand Wardleana*, *Caryocar nuciferum* (at Henaratgoda), *Glomeria jasminiflora*, *Renanthera alba*, *Sterculia acerifolia*, *Strobilanthes Dyerianus*, *Randia mussænda*, *Lagerstrœmia tomentosa* (?), *Bignonia magnifica*, *Agave glaucescens*, and several orchids.

It may be recorded as a rare occurrence that a tree of "Calamander" (*Diospyros quæsita*), which is becoming very rare in Ceylon, was found in the Province of Sabaragamuwa, in July last, bearing a crop of fruit. Seeds from these have been sent us by the Assistant Conservator of Forests, Western Province, and the plants raised from them are being carefully attended to.

Visitors.—Foreign visitors have been slightly on the increase, judging by the number of signatures (2,780) in the book kept at the entrance lodge. Among these the following botanists may be mentioned, apart from those who have worked at the Laboratory: Mons. Prudhomme, Director of Agriculture, Madagascar; Mr. Maiden, Director of Botanic Gardens, Sydney; Mr. D. G. Fairchild, Agricultural Explorer to the United States Department of Agriculture; Mons. L. Pynaert, Director of Botanic Gardens, Upper Congo, Africa; and Mr. Stanley Arden, Superintendent of Government Experimental Plantations, Federated Malay States. It is interesting to mention that a departmental album (purchased by the staff) has been placed in the Library. This is intended for photographs of scientific visitors as well as European and native officers who have held prominent offices in the Department, with a brief note as to service, &c., accompanying each photograph.

Fences.—Several of the old fences have been repaired, the one round the Lucerne plot was renewed, and a new fence, 128 lineal yards long, made of posts, rails, and wattles, was erected round a plot of land below the young gardeners' rooms. This enclosure is required for an additional nursery and for growing small patches of fodder.

Cinchona.—A small piece of jungle to the north of the camphor plantation has been cut down, cleared, and planted with plants of a special variety of cinchona. The plants were presented by the Manager of the Ceylon Tea Plantations Company. They made a very good start and grew into strong sturdy plants, but unfortunately the sambur deer found them out in the early part of December, and destroyed nearly every one.

Casuarina plantations.—The Casuarina plants, planted in patana land last year, have done very well. The rows which received a handful of lime to each plant show much better growth than those without. Some of these plants have grown to a height of 8 feet. They have, however, suffered much from the attacks of sambur deer, which have on several occasions broken through the fence and eaten off many plants. New plants have been set out to supply those destroyed, and this plantation promises to be a success.

Camphor.—There has been a great demand for camphor plants, and although we have not been able to supply the actual numbers applied for, every applicant has been supplied with some. No seeds have been received during the year, and as cuttings do not strike readily our stock is very nearly exhausted.

Experiments as to the quantity of camphor contained in the trees here have been undertaken by Mr. Kelway Bamber, and the results have been encouraging.

The plants here have continued to grow rapidly, and a few have flowered, though no fruit has set. This plantation is now five years old, and the largest tree is 22 feet high with a spread of branches of 15 feet, the stem being 27 inches in circumference at the base. One tree was partly coppiced on the 8th August, and gave 112 lb. of leaves, branches, and stems: three old stems were left uncut. The shoots from the cut stems number 39, the largest being 4 feet high and 1½ inch in circumference. This is remarkably good growth, and shows how well this plant will stand coppicing. Several plants have been clipped with hedge sheers, and others cut down like tea bushes. All have stood this treatment well and have broken into new growth in a very satisfactory manner. Judging from the way it behaves here, it is a very desirable plant to grow, and is likely to prove profitble.

Oaks.—The plantation of *Quercus ceris*, "Turkey Oak," has now become established, and promises to be successful. Both this species and the common English Oak, *Quercus robur*, broke

out into new growth in October. Several of the last named flowered and a few acorns have set, which proves that the plants are now established.

Holly.—It may be interesting to note that a plant of the common English holly, which was raised from seeds sown in 1895, has borne a few berries this year. I believe this is the first time that holly berries have been produced in this country.

Fruit Trees.—The dry weather appears to have been very beneficial to the foreign fruit trees, as they made very good growth after the light rains in May, especially the apples and plums.

Anona Cherimolia.—It has been generally supposed that the "Cherimoyer," though it grows remarkably well and flowers freely, would not fruit at this elevation—5,600 feet. However, I am glad to be able to report that one of the first plants introduced to Ceylon, and perhaps to the Eastern World, has borne 30 fruits here this year. The fruits, which ripened in November and December, were well shaped, of good size, weighing up to two pounds, with a circumference of 15 inches, and the flavour was delicious. Plants of this desirable fruit grown at elevations from 3,000 to 4,500 feet generally bear fruit in from four to five years from seeds.

The plant mentioned above is 15 or 16 years old, so that the higher the elevation the longer it takes to come into bearing. But the fruiting this year is probably due to the fact that the first 5½ months were very dry and favourable for the ripening of the buds and setting of the flowers.

Porcupines, Hare, and Mouse Deer.—Porcupines were again very destructive to arum and other lilies and bulbous plants at the beginning of the year.

Hares and mouse deer, especially the latter, have been very troublesome all through the year, more particularly among the violets and poppies, which plants they appear to be very fond of, the foliage of the plants being regularly eaten down.

Visitors.—The number of visitors recorded during the year was 1,818, against 1,805 last year. The largest number in any one month was 301 in April against 421 of the same month of the year before. The smallest number in any month was 34 in June against 19 in October last year.

8.—HENARATGODA GARDEN.

This has been kept in fair order during the year; the conservatory has been repaired, and also the bungalow. It is proposed to attach it in 1901 to Peradeniya in a more intimate way than has been the case hitherto, and a plan of working is being drawn up. The garden was visited by 310 visitors.

The average fall for the ten years 1891-1900 is 99·94 in. 162 days.

9.—ANURADHAPURA GARDEN.

This garden has as usual suffered much from drought. It has been kept in fair order, and various interesting experiments have been tried on a small scale. Until the opening of the new railway and irrigation works, there is but little to be done in this district. A small sale of plants goes on, and through the assistance of the Government Agent free distributions of useful plants and seeds are made in the outlying villages, a useful work which is beginning to bear fruit.

10.—BADULLA GARDEN.

This has continued to improve, and is now in very good order. The trees have been considerably thinned out, and the remainder have now room to expand. New and permanent cooly lines are much needed as well as a good plant house. The stock of plants for sale has been kept up, but there has been less inquiry for them than last year. Experiments on a comparatively large scale have been tried with tobacco and other products, but the space available is too small to do much more than keep up one or two plants of each of the kinds likely to be asked for. The main road through the garden was gravelled by aid of a vote of Rs. 100 kindly granted by the Local Board.

PRODUCTION OF COTTON AND COFFEE IN BRAZIL.

The Austro-Hungarian Consul at Rio de Janeiro reports that there are cotton trees throughout the Brazilian territories, which supply the whole of the material for the very numerous cotton factories there, the activity of which is yearly increasing. In the states of Rio de Janeiro and Minas Geraes, there are about thirty factories, having an aggregate of about 16,000 looms; the machinery, which is supplied by England, Germany, and North America, is set in motion by a great many waterfalls by means of hydraulic wheels. The manufacturers of yarn mix the Brazilian cotton with North American and Egyptian cotton, which ensures greater firmness. The most superior sorts, amongst them the genuine Sea Island, are produced in the neighbourhood of Alcantara, in the state of Maranham. The arrivals in 1899 amounted to 159,029 bales of about 80 kilos each. According to statistical returns the world's stock of coffee on January 1st, 1899, was 387,000 tons, or about 6,450,000 bags, a quantity which has never before been attained at that season of the year, and the 1899-1900 crop promised very abundant yield. The over-production in the Brazils had created a situation which filled even optimists with dismay. Although the consumption, in consequence of the low prices, had considerably augmented, it was feared that the heavy stocks and the large anticipated arrivals would prevent buyers coming forward. In order to counteract such a contingency a union was formed, styled "Centro da Lavouro do Café do Brazil," to carry on an active propaganda in order to augment consumption.—*Chamber of Commerce Journal*, for Feb.

"LES CULTURES COLONIALES."*

We have received a copy of this work (in French) by Henri Jumelle, Science Professor and Lecturer in Marseilles. In two volumes, one on "*Plantes Alimentaires*" and one on the "*Plantes Industrielles et Medicinales.*" The object of the author in these two volumes has been to collect, for the benefit of planters and the pupils in the Colonial Schools, information on the various methods of culture in use in different regions of the sub-tropical zone. There is great variety in these methods, probably owing to special conditions of climate and soil. M. Jumelle has tried, by comparing the climates and soils of countries in which the same product is cultivated, to deduce general laws as to the conditions most favourable to its growth.

This work is in two volumes. The first is devoted to Food Plants. M. Jumelle includes among these not only farinaceous plants, vegetables, cereals, sugar-yielding plants and fruits; but also spices, aromatic plants, and coffee and tea.

In the second volume, M. Jumelle takes up textile growths, oleaginous plants, rubber and gutta plants, perfume and varnish-yielding plants, dyes and tannin, medicinal plants, and those used for chewing and as narcotics, and those for fodder. This volume of 358 pages has 101 illustrations amongst the letterpress, while the former has 104 illustrations and 430 pages. (4 fr. per vol.) Seventeen pages only are devoted to Tea. We have first, broadly given, Habitat, Varieties of Tea and botanic description, their climate, soil and moisture, requisite manure, seeds and nurseries (how arranged,) transplanting, pruning, which is carefully described; harvesting or plucking and the making of tea; machinery, Jackson's roller being specially indicated; also Jackson's and Davidson's Drier. A sorting machine by M.G. Collom, and packing machine of Davidson & Co., are advised. "Green Tea is prepared almost exclusively in China," say they, "and is a little poorer in theine, but richer in tannin and essential oils, and therefore more exciting than ordinary tea." The process of manufacture is carefully described. One page is given to the Diseases of Tea, *i.e.*, to the Tea Bug, and cures, suggested by Dr. Trimen and Mr. Green, are described.

Every cultivated tropical product seems equally carefully disposed of. The work ought to be very valuable to residents in the tropics who can read French and meditate trying some new cultivation. There is a complete index of names of plants, etc., technical, botanical, and popular. The work is likely to be translated into other languages shortly.

* J. B. Baillière et Fils, Rue Hauteville 19, près du Boulevard St. Germain. Paris. 4 fr. per vol.

THE RETAIL SALE OF TEA TO NATIVES.

SHAKE OFF THE SENSE "OF INFRA DIG."

It is to be devoutly hoped that the Tea Association will lose no time in taking to heart the lecture upon self-help contained in the concluding paragraphs of the Viceroy's winding-up speech in the debate upon the Assam Labour Bill. There are two difficulties, however, that present themselves at the outset of driving a country trade in our teas; first, we have to encounter and overcome that unacknowledged but undeniably existing overstrained sense of gentility that pervades all classes of our countrymen when transported to India; anything like shop-keeping as pursued at home being considered *infra dig*, and yet, if we are to create a business in tea among all classes, the patrician toga must be discarded; in the second place, we venture to say there is not a tradesman connected with the Association, and one as an organiser is a *sine qua non*. We have urged repeatedly the opening of stalls at such places in town where the hordes of natives that are constantly on the move could obtain a cup of decent tea for a pice, and last year suggested the setting up of somvas at the large railway halting stations, but no attempt has been made to follow such up although the success as indicated in His Excellency's speech is assured. We are not in Messrs. Cresswell's confidence and, beyond knowing that they are credited with some plan or other for widely distributing tea among the masses, are quite in the dark as to the nature of what proceedings they purpose adopting. As far as Calcutta is concerned we have overwhelming evidence that, were some systematic method devised of furnishing the present peripatetic vendors of made tea with the means of filling their cans with a properly-concocted brew, the already pronounced taste would expand enormously and rapidly. We do not look for more than covering expenses at first, for the scheme must be regarded as a simple advertisement. Hitherto all idea of introducing our teas to the working classes has been centred upon selling small packets, but little ad-

vantage is likely to arise from that, as the consumers we wish to reach have no means of investing in teapots, *chulahs*, pannikins, etc, any more than their compeers at home have, yet the consumption of made tea among the latter is enormous. Our own opinion is that, if tea depots properly supervised were established at the several points where natives congest during the day, European supervision would not be needed for more than a couple of months, as the profits would be ample enough to induce respectable natives to take up the business; and in a very short time depots for the sale of ready-brewed tea would be as numerous as are those now for the sale of ice and the various syrups, while the demand from these places for leaf would go on increasing annually. Putting the matter into figures the returns from one pound work out as follows:—6 annas 1 lb. tea, 2 annas fuel, etc. 128 cups at 1 pice=Rs. 2. We allow one-eighth of an ounce to a cup. Profit enough in all conscience to justify the venture.—*Indian Planters' Gazette*, March 16.

THE ENGLISH AND FRENCH IN ABYSSINIA.

SOME ACCOUNT OF KING MENELIK'S NEW RAILWAYS,

(BY HERBERT VIVIAN.)

The French traders at Addis Ababa are really too fine for their place. They did very well so long as they possessed more or less of a monopoly. One of them, M Chefneux, is partner with M Ilg, Menelik's Swiss Minister for Foreign Affairs, as concessionaire of the Jibuti Railway, and they all consider themselves very great personages indeed. When Menelik grants them an audience, they go away again if he keeps them waiting five minutes. But their day is done. They cannot compete with Indian traders, who bring frugality, industry, and even honesty to bear, and therefore are not easy for a Frenchman to compete with. An Indian is content to travel down to the coast attended by one native servant and just the necessary amount of men to look after his baggage mules or camels. A Frenchman, on the other hand, thinks it necessary to travel like a prince, with a great retinue of armed men, and the expense of this swallows up the greater part of his profits. Moreover, he labours under the delusion that anything is good enough to sell to a native, whereas his system of sharp practice, though it may pay for a moment, cannot do so permanently. Before my departure from Addis Ababa, I had occasion to visit the store of one of

THE LEADING FRENCH TRADERS,

as some of my supplies were running out. He showed me several shelves of bottles, and I noticed in the two lower ones some very elaborate labels—"Grande Marque Extra Fine," and all the rest of it. Moreover, many bottles were done up elaborately in wire, like the very choicest and oldest brands in Europe. My curiosity was pricked as to the market which the man could hope to find for such luxuries in the heart of Abyssinia, but he said with a smile, "I don't recommend those. They are intended for the natives, and contain the filthiest stuff you ever imagined." This struck me as a very eloquent as well as a very frank epigram upon the attitude of French colonial trade.

The advantage which the French obtained by being first in the field is now rapidly fading away before the superiority of our methods and the superiority of our commercial honesty. The French themselves readily admitted Colonel Harrington, our representative at Addis Ababa, is an extremely able diplomatist, and he has certainly secured the confidence of the Emperor in a way that no European diplomatist ever did before. He is feared as well as respected, and Menelik knows that he will stand no nonsense.

"Our influence in Abyssinia," wrote a Frenchman, who has spent many years in the country, "is *nulle archinulle*, and has never existed there, save in the imagination of the promoters of the railway company. . . . The only nation which possesses a real and serious influence, imposed by fear, is the English, who use M Lagarde as their catspaw. The English have at Addis Ababa a master in the art of diplomacy, a man who knows his own mind, who does not humiliate himself with humble entreaties, and who has obtained everything he desires, and will continue to do so, for he exacts it." This is an exaggeration in so far as concerns the statement that French influence never has existed in Abyssinia. Indeed, at one time it was almost paramount, and I believe that an able diplomatist could revive it again. At present, Menelik feels that he cannot trust the French; while, as he told me when he received me in audience, he knows that

WHAT AN ENGLISHMAN SAYS IS A FACT,

and that what he undertakes to do is as good as done.

Just as French laudatory articles on Abyssinia were spread out over many years, to pave the way for the flotation of a French railway into the country, so the whole of my remarks have been intended to lead up to a survey of the past, present, and future of that enterprise. On March 9th, 1894, Menelik conceded to MM. Ilg and Chefneux the right to make a railway from Jibuti to Harrar, on to Addis Ababa, and thence to Kaffa and the White Nile. This railway was started as a commercial enterprise, and money was obtained from ordinary investors, who were actuated by the ordinary expectation of dividends. The promoters knew very well that the railway never could be a commercial success, and that it was impossible that there ever should be any dividends. But they were content with what the articles of association have called "the gratuitous transfer" to the company of their rights in the concession. This, being interpreted, means that they should receive (1) 8,000 shares; (2) £40,000 on the commencement of the second section from Harrar to Addis Ababa: (3) £40,000 more on the commencement of the third section towards Kaffa; (4) 100 founders' shares.

THE KEYNOTE OF FRENCH POLICY IN ABYSSINIA

for a very long time was to raise up an adversary against England in the Valley of the Nile. Menelik lent himself to this idea for what he could get, and negotiations proceeded very far for the advance of a Franco-Abyssinian army against us at the time of Fashoda. Whether or not his professions of friendship for France ever meant anything, he has now certainly come to his senses, and understands that if he weakened himself by a fruitless struggle with Egypt, the only result would be that he would find himself threatened with a French occupation. He gave a concession to the French railway, with the idea that he would obtain arms and ammunition more easily and more cheaply. But he has since realised that, while the railway would make the

transport of his guns easier, it would also enable the French to bring a formidable army into the heart of his empire at a moment's notice. So he hastened to modify his concession, and refused to allow the railway to have a terminus at Harrar. By a quibble, he fixed a place called El-Bah as the terminus, and gave it the name of Addis Harrar or New Harrar. It is sufficiently remote to eliminate danger, and at the same time sufficiently near to make the importation of arms very easy. For the commercial purposes of the railway, however, it will be of very little use, as the railway will not be able to divert the whole trade of Harrar, much of which will continue to follow the old caravan route. But even if the railway did secure the whole existing trade of Harrar, this would not suffice even to repay the expenditure. And this trade is rapidly falling away. During last year not a single Abyssinian merchant, coming from the interior, entered the place, though previously large numbers were wont to do so. The reason is that all the big merchants have already taken the Gallabat route. Gallabat is on the frontier of Abyssinia and Egypt, and the railway from Khartoum will be brought up the Blue Nile very near to it. This is the natural channel for trade, which in two or three years will all go that way; and, railway or no railway, there will only remain to Jibuti and Zaila the trade of the provinces of Harrar and Shoa. The Soudan and Khartoum railway will take all the trade that has hitherto been brought to Harrar from the interior. The Kassala-Suakim Railway, when finished, will also deflect much of the trade which has hitherto been brought to Harrar. From Lake Rudolph to Gallabat, the trade will follow the Nile Railway and Suakim Railway routes. At present one *corja* (*i.e.* twenty pieces of American piece goods), imported *via* Aden, Zaila, and Harrar to the Kaffa and other districts, costs in transport expenses alone about forty-five Maria Theresa dollars, while the cost of importing *via* Alexandria and the Nile Railway to the same district will only be twenty-five dollars. This will kill all Harrar trade with the interior, leaving only the Harrar and Shoa province trade. In two or three years the Harrar trade will be simply a local one in connection with the Harrar river and the Arusi country,—chiefly coffee. Thus the Jibuti Railway, if it reaches Harrar in two years, which is very doubtful, will get, say a quarter or a fifth of the total present trade. As the total

PRESENT TRADE COULD NEVER REPAY THE SHAREHOLDERS

it is bound to be a ruinous concern.

Knowing this, the officials of the railway have been content to allow the enterprise to proceed as slowly as possible, receiving their emoluments and delaying the day of reckoning as long as they can. In this matter they have been assisted considerably by circumstances. When, in Dec. 1897, the Issa tribe of Somalis realised that the first surveys of the railway were being made, and that a railway would take away their only means of livelihood, they gave out that they would make forcible opposition to every step of the undertaking. Accordingly the interim Governor of Jibuti made a provisional arrangement with the Okals (chiefs and elders of the Issas), undertaking not to survey or lay down lines for more than twenty kilometres from Jibuti without further notice. This extraordinary arrangement was intended to secure protection for French caravans going to and from Jibuti, at any rate until it should be necessary to proceed beyond the 20th kilometre. The French, however, have never regarded treaties with natives as binding upon themselves; and so soon as the dry season came and the Issa tribes went off with their flocks in search of fresh pastures, the railway people quietly went on with their surveys further inland. The natural result followed: caravans were attacked, and reprisals only aggravated matters. The authorities of the railway company tried to hush up every outrage and summoned a palaver of the chiefs of the Issas, with whom they concluded a fresh truce. The work of the railway was to be allowed to continue slowly, the Issas undertaking not to interfere, in consideration of the payment of 12,000 rupees. Four thousand rupees were paid in the course of the year 1898, but demands for the balance were resolutely ignored, and the tribesmen again felt that they had been tricked.

And the measures for defending the outposts of the company seem to have been exceedingly insufficient. The outpost at the 62nd kilometre, for instance, found itself on a given day with only forty cartridges. After endless demands and protestations, it succeeded in obtaining a hundred cartridges more from Jibuti. When on February 22nd, 1899, this outpost was attacked by a large band of Issas, the authorities need not have been surprised. Six Italians, one young Swiss, and two native guards were killed, and five Europeans were wounded, including an Italian woman and her child. It is to be hoped that the relatives of some of the victims will take proceedings against the company, whose non-payment of the 8,000 rupees due to the Issas was the direct cause of the attack. So far the only reply obtainable from the company has been that such attacks are to be expected in a state of war. The existence of a state of war upon French territory does not seem to strike the directors of the company or the French authorities as anything extraordinary. Moreover, when the servants of the company were engaged, they were not warned of the likelihood of any danger, lest they should demand heavier wages in consequence. The only consolation offered was that energetic measures would be taken to ensure the security of the works. These energetic measures, however, consisted merely in despatching sixty marines to Jibuti. They landed on March 13th, 1899, but only remained there until June 13th. The withdrawal of the garrison was due to a demand made by Menelik, who threatened to cancel the concession for the railway if so many troops remained in French Somaliland. Meanwhile no protest is directed againt the establishment of an Indian garrison in British territory at Zaila.

NOW COMES OUR OPPORTUNITY.

The Jibuti Railway has failed as a commercial enterprise. We must prevent the French Government from taking it up and utilising it as a stragetic instrument. If they do so, our prestige in Somaliland will perish, even Aden will suffer, and Jibuti may be utilised against us in the Soudan as a second Delagoa Bay. Already the fear of this has induced many merchants to migrate from Zaila to Jibuti.

There are many ways in which England might interfere. The moment is highly auspicious for buying up the shares in the railway, as those in the Suez Canal were bought up by Disraeli. Then we might negotiate with the French Government for the acquisition of French Somaliland by purchase or exchange. I hear that they would not be at all unwilling. Failing that, we ought to lose no time in constructing a railway from Berbera

into the interior. Menelik's consent is not necessary for a line up to our frontier at Ujawaji, a little south-west of Hargeisa, in the direction of Jigjiga. This has already been surveyed, and presents no difficulties, there being a steady rise all the way. The distance on to Jigjiga is only forty miles over a plain, and Menelik should have no objection to a railway terminus at Jigjiga. But even if we only penetrated to our frontier at Ujawaji, all the Harrar and Shoa trade would be attracted, and we should tap all the trade of Ogaden and South-East Abyssinia. Moreover, the tribesmen of the district would be benefited, instead of being ruined, as they will be in the Issa country by the Jibuti line.

I am convinced that the whole future of

BRITISH INFLUENCE IN NORTH-EAST AFRICA IS AT STAKE,

and that, unless prompt measures are taken, our Government will be responsible for a disgraceful and irretrievable surrender.

[The news has just been made public that the French concessionnaires of the Jibuti-Harrar-Addis Ababa Railway, which connects the capital of Abyssinia with the Red Sea, have concluded an agreement with three English companies whereby the latter find the money needed for the construction of the line, and thus practically control the undertaking.—ED. P.M.M.]

—*Pall Mall Magazine* March.

GRASS FARMS IN INDIA.

Of the nine grass farms in the Bengal command all excepting one showed a saving on the work of the year 1899-1900, the largest amount being R63,696 in the case of the Allahabad farm, and the smallest, R1,634 on the Dinapur farm. The solitary loss was that of 1,146 rupees in the case of the farm at Bareilly The net saving for the year over all the farms amounted to R208,320, and it is the largest which has accrued to the State since the inauguration of grass farms, The increased savings were conspicuous at Allahabad, Cawnpore Lucknow Sitapur; Meerut, and Muttra. The year was not very favourable for grass operations, as the rains were somewhat irregular. The establishment of grass farms has tended to reduce market rates very considerably. This was the experience as far back as 1886 when only one or two grass farms existed. Now the grass produce at the various farms is found sufficient to feed all Government animals on an average for ten months in the year. The abundance of the grass supply from these farms must result in the market being over-stocked with *bhoosa* (trodden straw), with the inevitable consequence of reduced rates. The nine farms range in area between 2,709 acres at Allahabad and seventy acres at Dinapur, and the aggregate area is 9,654 acres, the production of green grass upon which in 1899-1900 was 98,152,102 lb. The scarcity of fodder throughout the country during the year was unparalleled, andthere was a very large demand from native States, even so distant as Baroda. It is in such times that the actual benefits derived by Government from the establishment of grass farms can be adequately realised. If the farms had not existed and Government grass-cutters had been permitted, as in former years, to encroach on the lands of the ryots for grass, the hardships of the latter would have been intensified, while the Government requirements could not have been met without extreme difficulty and heavy expenditure. All Government horses and cattle were fed throughout the year at Cawnpore, Bareilly, and Fyzabad; and at Allahabad also except for about three months, when the transport cattle were fed on *bhoosa*. The balance of produce that remained on hand at the close of the year comprised 4,425,404 lb of silage, and 6,719,410 lb of hay dry bedding. The expenditure during the next few years on manuring operations is expected to be heavier than in past years as it is intended to trench lands more extensively with town rubbish for the cultivation of dub grass. This will not only yield a better quality of grass and a larger output but will obviate objections on sanitary grounds. Experiments on the fattening of cattle were made during the year at Allahabad, and the Government of India have since directed their continuance. The question of extending these investigations to other stations is under consideration. The improvement in the meat is very marked and Capt. D J Meagher, the special forage officer is of opinion that the benefits which will be derived from the fattening of slaughter cattle will more than compensate for the extra cost incurred in the feed. A training class in agriculture and dairying for British soldiers was started in Allahabad early in the year, under the orders of the Government of India. Fifteen students were selected, but they were not all of the stamp of men required for grass farming—probably owing to Government not being able at the time to hold out any definite prospects to applicants. Reverting to the the Government butchery, worked in connection with the grass farm at Allahabad, Brigadier-General Sir Charles Leslie reports that the experiments made in fattening slaughter cattle seem to indicate advantage to Government in not only getting a much superior quality of meat for the soldiers' rations, but in actually procuring these rations at a cheaper rate. He had some of the beef issued to bimself and found it to be the best he ever tasted in India.—*Indian Agrilcuturist*, March 1.

WHERE CAMPHOR COMES FROM.

AND THE VARIED USES IT IS PUT TO NOW-A-DAYS.

A page of the March *St. Nicholas* is filled with a paper by Ralph Benton entitled "Talking of Camphor."

"Where does this come from?" asked Sandy McLaurin, picking a block of camphor out of a jar that stood on the counter.

The druggist at the corner near Sandy's home was a good friend to all the boys, and they liked to ask him questions.

"Camphor? That 's a long story." The speaker and questioner sat down behind the prescription counter. "Have you ever noticed that row of lindens down on Fourth Street, near the grammar school? Well, the tree that produces camphor looks very much like any one of those. It grows in China, Japan, and other parts of eastern Asia. Occasionally a camphor-tree becomes so old and so large that it is a veritable land-mark. In 1691, for instance, a traveller in Japan described a tree which he found that was thirty-six feet about the trunk. Almost a century and a half later the same tree was said by another traveller to be fifty feet around.

"Did your grandmother ever make you take a few drops of spirits of camphor? You know what a fiery taste it has, then? You wouldn't think that camphor and the cinnamon sticks that you like so well are first-cousins; but they belong to the same botanical family.

"If you take one of the shiny green leaves from a camphor-tree and rub it gently between two stones, you smell the same odour as comes to you when you take the lid off a camphor-jar. Every part of the tree contains its part of the gum, but the bulk of it comes from the root, trunk, and branches. The first step is to reduce a tree to chips, and these are put into iron vessels having a

cone-shaped cover lined with rice straw. Then the vessels are heated, and the camphor is driven out of the chips. Do you know what I mean when I use the word 'volatile'? No? Well, a thing is volatile that seems to fly off in the air. Now, camphor is volatile; it is capable of being changed into vapor. When heat is applied to the iron vessels the camphor is volatilised, but it condenses almost at once; that is, it is changed to a multitude of tiny little lumps of solid camphor, which fasten themselves on the straw that lines the cover. It is then scraped from the straw, refined and pressed into blocks."

"Is camphor used for anything but medicine and to keep off moths?" asked Sandy.

"I was just coming to that. Strange as it may seem, we can get a substance from it that looks almost like ivory—hard and beautifully white. Go out to the first show-case on the left, and bring me a white comb and one of those hand-mirrors with a white back."

Sandy looked puzzled as he obeyed.

"This material," tapping the back of the mirror, "is called celluloid, and it is made from camphor and cotton. It is used for hair-brushes, soap-boxes, knife-handles, and many other articles. In another field we find that it plays its part in changing the map of the world or shaping the destiny of a nation. Camphor is used in making smokeless gunpowder. Our country certainly learned the value of it in the summer of '98."

"Why," Sandy ventured, "I should think, with all the big armies everywhere, that most of the camphor would be used for powder."

"A great deal of it is. That is why camphor has been so dear for a number of years past."

"Couldn't tar camphor be used?"

"Oh, no! Tar camphor is really not camphor at all, though somebody discovered, about twelve years ago, that it would take the place of camphor in preventing the ravages of moths. For many years it was thrown away; it was a puzzle to get rid of it. It comes, in a roundabout way, from bituminous coal. When this kind of coal is heated in a certain way it is split up into gas (used for lighting), a heavy, black liquid (coal-tar), and coke; and it is from the coal-tar that tar camphor is made. I couldn't begin to tell you all about coal-tar in one night, Sandy. Some other time we'll talk about it again."

INDIAN TEA ASSOCIATION LONON.

The following is part of the proceedings of a meeting of the Committee held on March 5th, 1901, when the following members were present:—Mr D Cruickshank (in the chair), and Messrs A Bryans, J S Hulbert, Robert Lyell, C C McLeod, F A Roberts, A G Stanton, J N Stuart, and C W Wallace.

GREEN TEA.—The correspondence on this question was read, and after discussion it was agreed that the decision come to on June 21st, 1900, should hold good in respect of the current season, viz., "that 1½ annas per lb, up to a maximum of 200,000 lb to be manufactured this season, be allowed out of the funds of the levy on the shipments of green tea for the American market, sent there direct from India, such funds to be distributed as a bounty at the discretion of the Calcutta Committee," the definition of the term "green tea" for the receipt of the bounty being taken to be tea made from the ordinary leaf plucked on the gardens, such as would be ordinarily made into black tea, but which in its altered manufactured state will not compete with the sale of black tea in America or elsewhere. The bounty to be paid on the same quantity as before sanctioned, viz., 200,000lb, until it is seen what success is attained in the manufacture of green tea, the Association in Calcutta to be requested to notify the committee promptly if a larger quantity than 200,000lb is likely to be specially prepared for shipment to America.

FISH CULTURE AT THE CRYSTAL PALACE.—An interesting experiment in fish culture is being made at the Crystal Palace. For some time past trout have been hatched and reared in the aquarium from eggs received from various parts of the country, and the process of treatment from the time when the eggs are placed in the hatching apparatus up to the full growth of the fish may be seen by visitors. The tanks contain a number of fine two and three-year-old trout. The experiment of rearing them has been undertaken by the Crystal Palace Company for the purpose of ascertaining whether the trout will live in the stagnant water of the great lake in the palace grounds. About 150 two-year-old rainbow trout (*Salmo Iridens*) have just been taken from the rearing tanks and placed in the lake. The number will be added to from time to time, and it is hoped that the trout will thrive, as there are no jack in the lake. In course of time, if the experiment succeeds, fly-fishing will be introduced at Sydenham. Anglers in the district are taking great interest in the matter, and a joint committee of various angling clubs is in course of formation with the view of protecting the waters and of arranging conditions under which the trout will be fished for. It has been already agreed that for the first year all fish hooked shall be returned to the water.—London *Times*, March 14.

RAINFALL RETURN FOR COLOMBO.

(*Supplied by the Surveyor-General.*)

	1896.	1897.	1898.	1899.	1900	Av of 31yrs.	1901
	Inch	Inch	Inch	Inch.	Inch.	Inch.	Inch.
January ..	2·92	3·81	2·32	6·98	3·72	3·24	11·91
February ..	0·35	1·68	1·98	2·78	0·63	1·89	5 12
March ..	5·64	3·66	4·21	0·88	3·71	4·75	0·99*
April ..	5·93	10·97	22·81	6·66	15·12	11·43	
May ..	9·31	8·30	5·80	17·73	10·63	12·04	
June ..	8·37	10·14	10·94	9·23	7·83	8·35	
July	2·85	5·24	6·15	1·11	6·77	4·30	
August ..	6·35	9·09	0·97	0·62	7·35	3·79	
September	10·99	4·58	6·90	1·48	4·00	4·98	
October ..	16·78	4·71	20·60	12·99	9·47	14 36	
November..	19.81	11·66	17·38	8·58	9·25	12·55	
December..	11·76	8·89	3-05	4·44	5·20	6·35	
Total..	101·06	82·73	103·11	73·48	83·68	88·03	21·57

* From 1st to 3rd April 0·99 inches, that is up to 9·30 a.m on the 4th April —ED. *C.O.*

SHARE LIST.

ISSUED BY THE

COLOMBO SHARE BROKERS' ASSOCIATION.

CEYLON PRODUCE COMPANIES.

Company	paid p. sh.	Buyers.	Sellers.	Transactions
Agra Ouvah Estates Co., Ltd.	500	—	900	...
Ceylon Tea and Coconut Estates	500	—	—	...
Castlereagh Tea Co., Ltd.	100	...	...	...
Ceylon Hills Estates Co. Ltd.,	100	—	—	—
Ceylon Provincial Estates Co. Ltd.	500	—	500	..
Claremont Estates Co., Ltd.	100	—	—	—
Clunes Tea Co., Ltd.	100	—	75	—
Clyde Estates Co., Ltd.	100		—	--
Doomoo Tea Co., of Ceylon Ltd.	100	60	—	—
Drayton Estate Co., Ltd.	100	...	...	...
Eila Tea Co., of Ceylon, Ltd.	100	..	40	—
Estates Co., of Uva, Ltd.	500	200	250	—
Gangawatta	500	—	—	..
Glasgow Estate Co., Ltd.	500	—	—	—
Great Western Tea Co., Ltd.	500	..	—	—
Hapugahalande Tea Estate Co.	200	—	—	..
High Forests Estates Co., Ltd	500	...	575	...
Do part paid	400	—	...	—
Horekelley Estates Co., Ltd.	100	65	..	66·25
Kalutara Co., Ltd.	500	—	300	—
Kandyan Hills Co., Ltd.	100	35	—	—
Kanapediwatte Ltd.	100	—	85	—
Kelani Tea Garden Co., Ltd.	100	—	—	—
Kirklees Estates Co., Ltd.	100	—	120	...
Knavesmire Estates Co., Ltd.	100	—	62½	—
Maha Uva Estates Co., Ltd	500	—	—	—
Mocha Tea Co., of Ceylon, Ltd.	500	—	..	...
Nahavilla Estate Co., Ltd.	500	—	200	—
Neboda Tea., Co. Ltd	500	..	500	—
Nyassaland Coffee Co. Ltd	100	—	—	..
Ottery Estates Co., Ltd	100	—	—	—
Palmerston Tea Co., Ltd.	500	...	400	—
Penrhos Estates Co., Ltd.	100	—	100	—
Pine Hill Estate Co., Ltd.	60	—	37·50	—
Pitakanda Tea Company	500	—	—	—
Putupaula Tea Co., Ltd.	100	--	—	..
Ratwatte Cocoa Co., Ltd.	500	—	—	250
Rayigam Tea Co. Ltd.	100	40	...	...
Roeberry Tea Co., Ltd.	100	..	60	...
Ruanwella Tea Co., Ltd.	100	—	30	..
St. Heliers Tea Co., Ltd.	500	—	..	...
Talgaswela Tea Co., Ltd.	100	—	35	...
Do 7 per cent Prefs.	100	..	70	..
Tonacombe Estate Co., Ltd.	500	..	325	...
Udabage Estate Co., Ltd.	100	...	...	..
Udugama Tea & Timber Co., Ltd.	50	..	..	..
Union Estate Co., Ltd.	500	...	200	...
Upper Maskeliya Estates Co. Ltd.	500	—	450	—
Uvakellie Tea Co., of Ceylon, Ltd.	100	—	65	—
Vogan Tea Co., Ltd.	100	52½	60	—
WanarajahTea Co.,Ltd.	500	..	1060	...
Yataderiya Tea Co., Ltd.	100	—	350	—

CEYLON COMMERCIAL COMPANIES.

Company	paid p. sh.	Buyers.	Sellers.	Transactions
Adam's Peak Hotel Co., Ltd.	100	..	30	..
Bristol Hotel Co., Ltd.	100	110	112½	—
Do 7 per cent Debts.	100	105	...	—
Ceylon Gen. Steam Navgtn. Co., Ltd.	100	..	220	—
Ceylon Superaëration Co. Ltd.	100	—	250	200
Colombo Apothecaries' Co. Ltd.	100	140	145	—
Colombo Assembly Rooms Co., Ltd.	20	15	..	...
Do prefs.	20	...	..	—
Colombo Fort Land and Building Co., Ltd.	100	—	85	..
Colombo Hotels Company	100	..	295	295
Galle Face Hotel Co., Ltd.	100	..	150	150
Kandy Hotels Co., Ltd.	100	...	125	..
Mount Lavinia Hotel Co., Ltd.	500	—	..	...
New Colombo Ice Co., Ltd.	100	—	...	225
Nuwara Eliya Hotels Co., Ltd.	30	..	30	...
Do 7 per cent prefs.	100	...	100	..
Public Hall Co., Ltd.	20	12½	15	—

LONDON COMPANIES *

Company	paid p. sh.	Buyers.	Sellers.	Transactions
Alliance Tea Co., of Ceylon, Ltd.	10	...	8¾—9¼	..
Anglo-Ceylon General Estates Co.	100	..	35—45	..
Associated Estates Co., of Ceylon	10	—	1½—2½	...
Do. 6 per cent prefs.	10	..	4—6	..
Ceylon Proprietary Co.	1	...	⅜—⅝	..
Ceylon Tea Plantation Co., Ltd.	10	..	24—25	..
Dimbula Valley Co., Ltd.	5	..	5¾—6	..
Do prefs.	5	..	5½—6	...
Eastern Produce & Estates Co. Ltd.	5	...	4½—5	..
Ederapolla Tea Co., Ltd.	10	...	7—10	...
Imperial Tea Estates Co., Ltd.	10	...	4½—5½	..
Kelani Valley Tea Asscn., Ltd.	5	..	5—6	...
Kintyre Estates Co., Ltd.	10	...	6—8	..
Lanka Plantation Co., Ltd.	10	..	4—5	..
Nahalma Estates Co.,Ltd.	1	—	nom	..
New Dimbula Co., Ltd.	1	...	2¾—3	..
Nuwara Eliya Tea Estate Co., Ld.	10	...	10—10½	...
Ouvah Coffee Co., Ltd.	10	..	6—7	...
Ragalla Tea Estates Co., Ltd.	10	..	9—10	..
Scottish Ceylon Tea Co.,Ltd.	10	—	13—15	...
Spring Valley Tea Co., Ltd.	10	...	2½—3½	..
Standard Tea Co., Ltd.	6	..	11—11½	..
The Shell Transport and Trading Company, Ltd.	1	..	2⅞—3⅛	..
Uknwella Estates Co., Ltd.	25	—	par	...
Yatiyantota Ceylon Tea Co., Ltd.	10	...	6½—7½	...
Do. pref. 6 o/o	10	...	10—10½	..

BY ORDER OF THE COMMITTEE.

Colombo, March 29th, 1901.

* Latest London Prices.

THE LOCAL MARKET.

(By Mr. James Gibson, Baillie St., Fort.)

Colombo, March 28th, 1901.

COFFEE :—		
Estate Parchment per bushel	None.	
Chetty do do	Nil.	
Native Coffee per cwt.	Nil.	
do F. O. B. per cwt.	Nil.	
Liberian coffee :—per bushel	Nil.	
do cleaned coffee:—per cwt.	Nil.	
Cocoa unpicked:—per cwt	R45·00 to 52·00	Market quiet.
do cleaned do	R55·00 to 60·00	Market quiet.
Cardamoms Malabar per lb	R1·40	
do Mysore do	R1·70	
RICE:—		
Soolai per bag of 164 lb. nett	R9·49 to 9·62	
1st quality:—per bushel	R3·65 to 3·70	
Soolai 2 & 3rd. do do	R3·59 to 3·64	
Coast Calunda	none.	
Coast Kara	R3 90 to 4·00	scarce.
Kazala	R3·55 to 3·60	
Muttusamba Ordinary	R4·00 to 5·00	
Cinnamon per lb No 1 to 4	R00·52	
do do 1 and 2	R00·61	
do Chips per candy	R80·00 to 82·50	
Coconuts Ordinary per thousand	R40·00 to 45·00	
do Selected do	R46·00 to 50·00	
Coconut Oil per cwt	R15·00	
do do F. O B. per ton	R300·00	
POONAC:—		
Gingelly per ton	R112·50	
Coconut Chekku do	R115·00	
do Mill (retail) do	R85·00	scarce.
Cotton Seed per ton	R90·00	
Copra per candy		
Kalpitiya do	R49·00	
Marawilla do (Boat)	R49·00	
Cart Copra do	R45·00	
Satinwood per cubic feet.	Nil.	
do Flowered do	Nil.	
Halmilla do	R1·90	
Palu do	R1·00 to 1·12	
Ebony per ton	R100·00 to 230·00	
Kitul fibre per cwt	R30·00 to 32·00	
Palmyra do do	R7·50 to 13·00	
Jaffna Black Cleaned per cwt	none	
do mixed do	R10·50 to 12·00	
Indian do	R7·00 to 10·00	
do Cleaned do	R8·50 to 13·00	
Sapanwood per ton	R40·00 to 45·00	
Kerosene oil American per cases,	R6·85 to 7·00	
do bulk Russian, per tin	R2·97 to 2·99	
do Russian per cases	R6·05 to 6·15	
Nux Vomica per cwt	R2·50 to 7·00	
Croton Seed per cwt	R20·00 to 22·00	
Kapok cleaned f o b per cwt	R23·00	
do uncleaned do	R5·00	
Plumbago per ton, according to grade: Large lumps	R225·00 to 550·00	Market dull
Ordinary size lumps	R225·00 to 425·00	Market dull
Chips	R125·00 to 325·00	Market dull
Dust	R60·00 to 125·00	Market dull

COLOMBO PRICE CURRENT.

(Furnished by the Chamber of Commerce.)

EXPORTS.

Colombo, 1st April 1901.

Cardamoms:—
All round parcel, well bleached per lb. R1·70
Do. dull medium do. R1·40
Special assortment, 0 and 1 only do. R2·00
Seeds do. R1·40

Cinchona Bark:—
Per unit of Sulphate of Quinine 12c—1½ to 3 o/o.

Cinnamon:—
Ordinary assortment per lb. 56c.
Nos. 1 and 2 only per lb. 61c.
Nos. 3 and 4 only per lb. 53c.

Cinnamon Chips:—
Per candy of 560 lb R82·50

Cocoa:—
Finest estate red; unpicked per cwt R60
Medium do do R52
Bright native, unpicked and undried R49
Ordinary do do do R43

Coconuts—(husked).
Selected per thousand R49·00
Ordinary ,, R39·00
Smalls ,, R29·00

Coconut Cake—
Poonac in robins f. o. b. per ton R75·00
Do in bags None

Coconut (Desiccated).
Assorted all grades per lb 16c

Coconut Oil—
Dealers' Oil per cwt R15·00.
Coconut Oil in ordinary packages f. o. b. per ton R335·00.

Coffee.—
Plantation Estate Parchment on the spot per bus.—None.
Plantation Estate Coffee f.o.b. (ready) per cwt.—None.
Native Coffee, f.o.b per cwt.—None.

Citronella Oil—
Ready do per lb.—50c

Copra—
Boat Copra per candy of 560 lb. R49·00
Calpentyn Copra do do R49·00
Cart do do do R45·00
Estate do do do R50·00

Croton Seed per cwt—None

Ebony—
Sound per ton at Govt. depot—R230 As per last Govt. sales of Dec 3rd.
Inferior R155.—As per last Govt. sales of Dec 3rd.

Fibres—

Coconut Bristle	No. 1		per cwt	R10·50
Do	,, 2		,,	None
Do mattress	,, 1		,,	4·00
Do	,, 2		,,	3·00
Coir Yarn, Kogalla	,, 1	to 8		18·00
Do Colombo	,, 1	to 8		16·00
Kitool all sizes			,,	None
Palmyrah			,,	None

Pepper—Black per lb None

Plumbago—

Large lumps	per ton	R550	Market dull.
Ordinary lumps	do	425	
Chips	do	325	
Dust	do	180	
Do (Flying)		125	

Sapanwood— per ton None.
Satinwood (ordinary) per cubic ft. None.
Do do per cubic ft. None.

Tea—	High Grown Average.	Medium Average.	Low Grown Average.
Broken Pekoe and Broken	cts	cts	cts
Orange Pekoe per lb	63	49	45
Orange Pekoe do	55	43	38
Pekoe do	46	38	33
Pekoe Souchong do	44	33	28
Pekoe Fannings do	38	33	27
Broken mixed—dust, &c per lb	23	22	21

CEYLON EXPORTS AND DISTRIBUTION FOR SEASONS 1900 AND 1901.

COUNTRIES	Black Tea.		Coffee—cwt.			Cocoa	C'moms	Cinnamon		Coconut Oil.		Copra	Desiccated Coconut	Poonac	Coconuts.	Plumbago.		Fibre.	Ebony
	1901 lbs.	1900 lbs.	Plantation	N'tive	Total.	cwts.	lbs.	Bales lbs.	Chips. lbs.	1901 cwt	1900 cwts	cwts.	lb.	cwts.	No.	1901 cwts.	1900 cwts.	cwts	cwts.
To U K. ..	26855772	25946316	1486	..	1486	19047	69977	232865	76436	31467	56700	2000	1235353	...	2818705	25520	25317	15264	622
,, Austria ..	16925	2069	..	..	...	...	..	5000	5600	772	2220	8394	18201	-	..	...	..	...	...
,, Belgium ...	5879	1880	53	..	53	....	..	20809	12592	1497	...	14378	96390	4001	...	3157	8523	4417	...
,, France ..	91915	56998	4	...	4	..	1469	12900	3920	...	..	6567	2240	...	..	..	..	246	..
,, Germany ..	71074	88519	.	..	..	804	6883	126600	119908	..	3045	13184	184185	13951	312855	10671	16918	4908	1967
,, Holland ..	11505	2000	...	..	..	..	..	1000	17920	..	...	..	6500	..	..	..	912	569	...
,, Italy ..	2493	1433	..	..	..	..	...	22500	16800	...	..	..	..	..	2000	..	...	...	...
,, Russia ..	1969	2274362	..	..	...	48	764	..	..	...	..	12210	..	..	..	599	...	..	..
,, Spain ..	...727	7470	..	...	..	..	..	35800	19600	..	..	...	10370	...	..	...	.	..	...
,, Sweden ..	17266	21725	...	..	..	..	..	..	..	199	...	...	6450	...	..	..	105	..	...
,, Turkey ..	13067	7661	...	..	...	...	..	..	...	..	...	...	...	...	...	...	...	..	..
,, India ..	475857	1636.2	59	..	59	..	48121	..	.	20510	14328	300	..	...	263900	158	69	..	..
,, Australia ..	3975406	3279815	352	..	352	75	...	1500	14784	94	21	..	202564	..	..	13	210	1506	..
,, America ..	665	1725142	27	..	27	889	..	42100	31516	7007	26253	1	425798	..	..	41213	65345	709	..
,, Africa ..	65581	55798	..	..	..	..	..	..	..	33	...	..	1600	..	243370	...	...	...	..
,, China ..	445098	214060	8	...	8	149	1034	5000	..	707	...	..	65000	..	..	..	..	..	...
,, Singapore ..	35376	18891	..	..	...	646	..	4700	..	...	..	...	..	...	...	..	...	96	...
,, Mauritius ..	8390	...	..	..	..	...	..	..	..	..	..	...	..	...	...	..	..	.	...
,, Malta ..	85150	115178	..	...		..	..	...	..	..	..	..	...	..	..	.	..	..	..
Total export from 1st Jan. to 1st April. 1901	34810986	33982329	1989	...	1939	21658	128248	510765	359076	62286	102567	57034	225461	17952	3640830	81450	117[illegible]99	27715	2589

MARKET RATES FOR OLD AND NEW PRODUCTS

(From Lewis & Peat's Fortnightly Price Current, London, March 20th, 1901.)

	QUALITY.	QUOTATIONS.
ALOES, Soccotrine cwt.	Fair to fine dry	44s a 85s
Zanzibar & Hepatic ,,	Common to good	20s a 60s
ARROWROOT (Natal) lb.	Fair to fine	5½d a 6¼d
BEES' WAX, cwt.		
Zanzibar & Bombay White ,,	Good to fine	£6 a £7 10s
Zanzibar & Bombay Yellow ,,	Fair ,,	£6 5s a £6 17s 6d
Madagascar ,,	Dark to good palish	£6 10s a £7 5s
CAMPHOR, China ,,	Fair average quality	175s
Japan ,,	... .	190s
CARDAMOMS, Malabar lb	Clipped, bold, bright, fine	2s 3d a 2s 4d
	Middling, stalky & lean	1s 5d a 1s 7d
Ceylon. Mysore ,,	Fair to fine plump	1s 6d a 4s [illegible]d
	Seeds	1s 11d a 2s 6d
,, Tellicherry ,,	Good to fine	2s 11d a 3s
	Brownish	2s 6d
,, Long ,,	Shelly to good	1s a 2s 9d
,, Mangalore ,,	Med brown to good bold	2s a 3s 6d
CASTOR OIL, Calcutta ,,	1sts and 2nds	4½d a 4¾d
CHILLIES, Zanzibar cwt.	Dull to fine bright	35s a 45s
CINCHONA BARK.– lb. Ceylon	Ledgeriana Orig. Stem	3d a 6¾d
	Crown, Renewed	5d a 7d
	Org. Stem	3¾d a 5½d
	Red Org. Stem	3⅜d a 5d
	Renewed	5¾d a 7½d
	Root	3¾d a 4d
CINNAMON, Ceylon 1sts per lb.	Ordinary to fine quill	10d a 1s 6d
2nds	,, ,,	9d a 1s 5d
3rds	,, ,,	8½d a 1s 4d
4ths	,, ,,	8d a 11d
Chips	,, ,,	2¾d a 10d
CLOVES, Penang lb.	Dull to fine bright bold	4½d a 9d
Amboyna ..	Dull to fine	4⅜d a 5½d
Zanzibar and Pemba	Good and fine bright	4½d a 4¾d
	Common dull to fair	4⅓d a 4⅜d
Stems ..	Fair	1⅜d
COFFEE Ceylon Plantation ,,	Bold to fine bold colory	92s 6d a 110s
	Middling to fine mid	80s a 90s
	Low mid. and low grown	
	Smalls	50s a 60s
Native	Good ordinary	30s a 70s
Liberian ,,	Small to fine bold	35s a 40s
COCOA, Ceylon ,,	Bold to fine bold	8[illegible]s 6d a 102s 6d
	Medium and fair	72s a 80
	Native	55s a 70s
COLOMBO ROOT ,,	Middling to good	12s a 22s 6d
COIR ROPE, Ceylon ton		nominal
Cochin ,,	Ordinary to fair	£13 10s a £13
FIBRE, Brush ,,	Ord. to fine long straight	£16 a £19
Cochin ,,	Ordinary to good clean	£20 a £24
Stuffing ,,	Common to fine	£7 a £9
COIR YARN, Ceylon ,,	Common to superior	£15 a £30
Cochin ,,	,, ,, very fine	£12 a £32
do. ,,	Roping, fair to good	£10 a £14 10s
CROTON SEEDS, sift. cwt.	Dull to fair	25s a 35s
CUTCH ,, ,,	Fair to fine dry	23s a 35s
GINGER, Bengal, rough ,,	Fair	34s
Calicut, Cut A ,,	Good to fine bold	80s a 100s
B & C ,,	Small and medium	37s 6d a 77s 6d
Cochin Rough ,,	Common to fine bold	30s a 36s
	Small and D's	28s a 33s
Japan ,,	Unsplit	29s a 31s
GUM AMMONIACUM ,,	Sm. blocky to fine clean	20s a 45s
ANIMI, Zanzibar ,,	Picked fine pale in sorts	£10 7s 6d a £20
	Part yellow and mixed	£8 2/6 a £10 10s
	Bean and Pea size ditto	70s a £9 2/6
	Amber and dk. red bold	£5 10s a £7 10s
	Med. & bold glassy sorts	80s a 100s
Madagascar ,,	Fair to good palish ...	£4 8s a £8
	,, ,, red	£4 5s a £9
ARABIC E. I. & Aden ,,	Ordinary to good pale	35s a 60s
Turkey sorts ,,		50s a 75s
Ghatti ,,	Pickings to fine pale ...	12s 6d a 35s
Kurrachee ,,	Good and fine pale ...	52s 6d a 55s
	Reddish to pale selected	30s a 40s
Madras ,,	Dark to fine pale ...	23s a 35s
ASSAFŒTIDA ,,	Clean fr to gd. almonds	40s a 90s
	Ord. stony and blocky	6s a 25s
KINO ,,	Fine bright	1s 6d a 1s 9d
MYRRH, picked ,,	Fair to fine pale	90s a 107s 6d
Aden sorts ,,	Middling to good	50s a 80s
OLIBANUM, drop ,,	Good to fine white	35s 6d a 50s
	Middling to fair	25s a 35s
pickings ,,	Low to good pale	17s a 23s
siftings ,,	Slightly foul to fine	16s 6d a 18s
INDIARUBBER, Assam lb	Good to fine	2s 6d a 2s 7¼d
	Common to foul & mxd.	1s a 2s
Rangoon	Fair to good clean ...	2s a 3s
Borneo	Common to fine	1s a 2s 3d

	QUALITY.	QUOTATIONS.
INDIARUBBER, *(Contd)* Java, Sing. & Penang lb.	Foul to good clean ..	8d a 3s
Mozambique ,,	Good to fine Ball ...	2s 6d a 3s 2d
	Ordinary to fair Ball ...	1s 10d a 2s 6d
	Low sandy Ball ...	1s 3d a 1s 7d
	Sausage, fair to good ..	2s 6d a 3s 1d
	Liver and Livery Ball ..	2s 4d a [illegible]s
Nyassaland	Fair to fine ball ..	2s 5d a 2s 10d
	Fr to fine pinky & white	2s 6d a 2s 9d
Madagascar ,,	Fair to good black ..	2s a 2s 6d
	Niggers, low to fine .	[illegible]d a 2s 3d
INDIGO, E.I.	Bengal—	
	Shipping mid to gd violet	3s 4d a 4s 2d
	Consuming mid. to gd.	3s a 3s 4d
	Ordinary to mid.	2s 8d a 2s 10d
	Mid. to good Kurpah	2s a 2s 8d
	Low to ordinary	1s 9d a 2s
	Mid. to good Madras	1s 9d a 2s 8d
MACE, Bombay & Penang per lb.	Pale reddish to fine	2s a 3s
	Ordinary to fair	[illegible]s 4d a 1s 11d
	Pickings	1s 3d a 1s 4d
MYRABOLANS, Madras cwt	Dark to fine pale UG	6s a 7s
	Fair Coast	5s 6d a 6s
Bombay ,,	Jubblepore	4s 3d a 7s
	Bhimlies	4s 9d a 9s 6d
	Rhajpore, &c.	4s 3d a 8s
Bengal ,,	Calcutta	4s 6d a 6s
NUTMEGS— lb. Bombay & Penang ,,	64's to 57's	2d 1½d a 2s 6d
	110's to 65's	11½d a 2s 1d
	160's to 130's	6d a 11d
NUTS, ARECA cwt.	Ordinary to fair fresh	14s a 17s
NUX VOMICA, Bombay per cwt.	Ordinary to middling	4s a 5s 6d
Madras	Fair to good bold fresh	7s a 10s
	Small ordinary and fair	5s 6d
OIL OF ANISEED ,,	Fair merchantable	5s 6d
CASSIA ,,	According to analysis	[illegible]s 8d a 4s
LEMONGRASS ,,	Good flavour & colour	4½d
NUTMEG ,,	Dingy to white	1⅜d a 3d
CINNAMON ,,	Ordinary to fair sweet	3¼d a 1s 6d
CITRONELLE ,,	Bright & good flavour	1[illegible]d a 1s 0½d
ORCHELLA WEED—cwt Ceylon ,,	Mid. to fine not woody..	10s a 12s 6d
Zanzibar. ,,	Picked clean flat leaf ...	10s a 16s
	,, wiry Mozambique	10s a 11s
PEPPER - (Black) lb. Alleppee & Tellicherry	Fair to bold heavy ..	5⅞d a 6½d
Singapore	Fair	6d a 6s 1·16d
Achcen & W. C. Penang	Dull to fine	5¾d a 6⅛d
PLUMBAGO, lump cwt.	Fair to fine bright bold	35s a 40s
	Middling to good small	20s a 32s
chips	Dull to fine bright ..	10s a 20s
dust	Ordinary to fine bright	5s a 10s
SAFFLOWER	Good to fine pinky .	65s a 75s
	Inferior to fair .	40s a 60s
SANDAL WOOD— Bombay, Logs ton.	Fair to fine flavour ..	£20 a £50
Chips ,,	... ...	5s a £8
Madras, Logs ,,	Fair to good flavour ..	£20 a £50
Chips ,,	Inferior to fine ...	£4 a £8
SAPANWOOD Ceylon ,,	Fair to good ..	£5 a £5 10s
Manila ,,	Rough & rooty to good	£4 10s a £5 15s
Siam ,,	bold smooth ...	£7
SEEDLAC cwt.	Ord. dusty to gd. soluble	51s 6d a 59s 6d
SENNA, Tinnevelly lb	Good to fine bold green	5d a 6d
	Fair middling medium	3½d a 4½d
	Common dark and small	¼d a 2¾d
SHELLS, M. o'PEARL— Bombay cwt.	Bold and A's	£3 10s a £4 15s
	D's and B's	
	Small ...	
Mergui ,,	Small to bold ..	£5 12s 6 a £7 10s
Mussel ,,	Small to bold ...	22s a 60s
TAMARINDS, Calcutta ...	Mid. to fine bl'k not stony	15s a 16s
per cwt. Madras	Stony and inferior ..	7s 6d a 11s
TORTOISESHELL— Zanzibar & Bombay lb.	Small to bold dark mottle part heavy	14s 6d a 24s 6d
TURMERIC, Bengal cwt.	Fair ...	28s nom.
Madras ,,	Finger fair to fine bold bright	22s a 30s
Do. ,,	Bulbs ..	18s
Cochin ,,	Finger ..	24s
	Bulbs ..	6s 9d a 7s
VANILLOES— lb. Mauritius ... 1sts	Gd. crysallized 3½ a 9 in	16s a 26s 6d
Bourbon ... 2nds	Foxy & reddish 4½ a 8 ,,	15s a 18s
Seychelles 3rds	Lean and inferior ...	8s a 13s
VERMILION lb.	Fine, pure, bright ...	3s a 3s 3d
WAX, Japan, squares cwt	Good, white hard ...	33s 6d

THE

AGRICULTURAL MAGAZINE,

COLOMBO.

Added as a Supplement Monthly to the "TROPICAL AGRICULTURIST."

The following pages include the Contents of the *Agricultural Magazine* for April :—

Vol. XII.] APRIL, 1901. [No. 10.

THE SCHOOL OF AGRICULTURE.

ON the recommendation of the last Commission appointed by Government to deal with this institution, the School was closed on Friday, the 29th March, the end of the first term of the year. Thus terminates an educational venture which, if it was not a complete success, was certainly not a complete failure. We do not for a moment intend to contend that the school fulfilled the object with which it was launched by Mr. H. W. Green, late Director of Public Instruction, but what we do say is that it surely and certainly exercised an influence for good,—by its very existence, if in no other way—on local agricultural ideas and agricultural practice in general. The institution was a centre of various forces, some sharply directed towards it as adverse and very often unjust criticism; some rising out of it as benefits (however insignificant) it conferred on the agriculturists of the Island, while between these opposite forces were others inclined at various degrees representing various other phases of public opinion. The very circumstance of the school, its work, and its object having been a subject of so much criticism and discussion was itself a factor in directing public thought to the latest developments of agricultural teaching, and so of the science and practice of agriculture, and we make bold to say that but for the existence of the school with its much criticised methods of instruction, the advancement of agricultural knowledge, and especially the expansion that has undoubtedly taken place in local ideas regarding agricultural practice, would have taken twice or perhaps three times as long to reach its present stage. In this way we say the school has served its purpose, and it is with some regret that we think of its passing into the region of the "Has Been." We also fancy that there will be some who will miss the old place, for it had its correspondents and enquirers, those who came to look up the library of authorities, or read up the latest information in the excellent agricultural reading-room attached to the school. With the institution will also no doubt go the useful little monthly publication which the school had reason to be proud of, as having appeared regularly since July, 1889. The Magazine will probably cease to be issued after June, when it closes its XIIth Volume.

We are, however, glad of one thing, and that is, that the cause of agricultural education is not to be altogether abandoned, as a new scheme of agricultural instruction (already referred to by us in the March number) has received the sanction of Government. We have reason to believe that this scheme has much to commend it, and we wish it a full measure of practical success.

RAINFALL TAKEN AT THE SCHOOL OF AGRICULTURE DURING THE MONTH OF FEBRUARY, 1901.

1	Friday ..	Nil	18	Monday ..	·06
2	Saturday ..	Nil	19	Tuesday ..	Nil
3	Sunday ..	Nil	20	Wednesday	·59
4	Monday ..	·12	21	Thursday ..	·21
5	Tuesday ..	Nil	22	Friday ..	·02
6	Wednesday ..	Nil	23	Saturday ..	·50
7	Thursday ..	Nil	24	Sunday ..	Nil
8	Friday ..	Nil	25	Monday ..	Nil
9	Saturday ..	·12	26	Tuesday ..	1·00
10	Sunday ..	Nil	27	Wednesday	Nil
11	Monday ..	Nil	28	Thursday ..	·01
12	Tuesday ..	Nil	1	Friday ..	·01
13	Wednesday ..	Nil			
14	Thursday ..	Nil		Total..	2·64
15	Friday ..	Nil		Mean..	·094
16	Saturday ..	Nil			
17	Sunday ..	Nil			

Greatest amount of rainfall in any 24 hours on the 26th, 1·00 inches.

OCCASIONAL NOTES.

We are greatly in favour of a Veterinary Hospital being established in Colombo, and with the expansion of the Veterinary Department this should be an easy matter and entail very little expense if worked in connection with the Society for the Prevention of Cruelty to Animals, as in Bombay. In the last report issued by the Madras Department of Land Records and Agriculture we read:—"The Veterinary Hospital continues to increase in popularity and the number of cases treated has risen from 280 in 1895-6 to 724 in 1890-99 and 804 in 1899-1900."

Mr. J. W. Mollison, late of the Poona Farm and Deputy Director of Agriculture, Bombay Presidency, has been appointed Director-General of Agriculture for India. We do not think a better appointment could have been made. Mr. Mollison, with his mature experience of Indian Agriculture, should make an ideal Director.

An American fruit-grower is said to have discovered a plan by which ants can be kept from getting on to trees, so desirable especially when budding or grafting has been done. This plan is most simple, viz., saturating woollen strings with castor-oil and tying these tightly round the trunks of the trees. It is said that ants will not cross over the wool. Experiments with cotton string and other oils are reported to have been unsuccessful, but some of our Ceylon oils should surely do as well as Castor.

"Preserved eggs" is the name given to eggs that have been kept in a solution of salt and lime. It is said that there is no appreciable difference between them and fresh eggs after nearly six months, and that the plan of preserving eggs in this way enables poultry keepers to wait for good prices when eggs are cheap.

PRACTICAL HINTS TO HORSE-OWNERS.

Chapter III.—Shoeing.

Shoeing may be described as "a necessary evil," and like many other "evils" of civilization requires the greatest attention, in order that the conformity of the foot may as far as possible be preserved. The artificial protection of the foot that is necessary in the case of animals impressed into the service of man, has been secured by various means since the usefulness of the horse was recognized. It was to the interest of horsemen to see that their animals suffered no discomfort arising from bad shoeing. Faulty shoeing not only directly affects the foot, but is indirectly responsible for many forms of lameness. It is on this account that so much importance is put on the shoeing question by all Veterinary Colleges, where both a scientific knowledge as well as a practical acquaintance with the structure of the horses' foot and the means of protecting it by shoes is insisted on.

As this paper is intended for laymen, I do not propose to enter fully into the anatomical and physiological structure of the horses' foot, but will only refer to its constituent parts so as to indicate the true functions which the foot is intended to perform.

Anatomically the foot is divided into three parts, viz., (1) the bone structure; (2), the sensitive structure; (3), the non-sensitive outer covering of the foot or the hoof. The outer hand and horny layer is intended by nature to protect the internal soft and vascular tissue, but this provision fails when the horse is taken from its natural habitat or surroundings, and is put to work on hard and often metalled roads. The object of putting on shoes is to prevent the wasting of the protective structure, which is an out-growth from the coronary band. The outer hoof is generally spoken of as the wall, and is protected by a hard glistening surface called the perioptic layer, which if filed of as is usually done by ignorant smiths gives rise to "brittle hoof" and other troubles.

THE "UNCULTIVATED" OILS OF CEYLON.

(*Continued.*)

7. Dorana Oil.—This is the product of *Dipterocarpus glandulosus* (Dipterocarpaceae), a large tree endemic to Ceylon and found in no great abundance in the moist low-country of the Island. The oil is blackish and resinous, and is said to be a good substitute for the well-known gurgun (the product of *D. turbinatus* and other species) used in the treatment of leprosy. Being got from the wood it is described as a wood oil. With Hal resin (exuded by *Vateria acuminata*) it forms an excellent varnish, and with vermillion in addition, produces a red lacquer.

8. Me Oil.—This is the product of *Bassia longifolia* (Sapotaceae), a very large branched tree common to the dry region. The oil is got from the seeds, and is used in native cookery as well as medicinally in the external treatment of cutaneous diseases. The residual cake after the expression of the oil is called "arappo," and exported to the Indian Coast. This substance is used as a deterrent and also largely employed for washing the hair. The oil when kept settles down into a solid fat.

9. Kekuna Oil.—This is the product of *Aleurites triloba* (Euphorbiaceae), and is sometimes spoken of as candle-nut oil. The seeds yield about 50 per cent of oil which is very suitable for soap-making and cloth-dressing, and for these purposes there is some demand for the oil from abroad. The refuse cake is a valuable fertilizer. Kekuna oil in many ways resembles linseed oil, and may be used as a substitute for the latter in mixing paints. The roasted nut is pleasant to eat but is laxative in its effect.

10. Domba Oil.—This is the product of *Calophyllum inophyllum* (Guttiferae), a moderate-sized tree found in the low-country, principally on the sea-coast. The nuts from which the oil is obtained are to some extent exported to India. The tree is sometimes called the Alexandrian laural. The seeds contain abundant oil, according to some reports even up to 60 per cent of their weight. This oil is used for burning as we

as for caulking vessels, but is chiefly valued as a medicine, being employed externally for rheumatism and also in the treatment of indolent sores. Watt mentions the curious fact that though it cannot compete with castor oil for industrial purposes, it fetches in Burma four-times the Calcutta price of castor oil. Samples of the three last-mentioned oils were submitted to Mr. L. Field, a well-known expert in oils, and in a report submitted by him he speaks very highly of them, and expresses the opinion that a very large demand for them would arise if they could be supplied at a cheap rate.

11. Margosa or Kohomba Oil.—This is the product of *Azadriachta indica* (Meliaceae), a handsome tall tree common in the dry country. It is extensively employed as an external application for rheumatism, also as an anthilmentic and antiseptic. It is invaluable as a cattle medicine in the treatment of wounds, and even foot and mouth disease, owing to its antiseptic properties, and in keeping off flies. The powerful and disgusting odour of the oil is its most objectionable property.

12. Kon Oil.—This is the product of *Schleichera trijuga* (Sapindaceae), a handsome tree called the Ceylon oak. The oil which is clear and liquid is used for culinary and illuminating purposes. It is reported, says Watt, to be the original Macassar oil, and has recently reappeared in German commerce under that name.

QUARTER-ILL.

We omitted to acknowledge the authorship of the short account of this disease which appeared in the last number of the Magazine, and which was written by Veterinary-Surgeon Chinniah. We make no apology for returning to this subject in view of the report that cases of Quarter-ill occurred in the Government Dairy not long ago, and as an unfamiliar form of disease among local stock, we would quote from an exhaustive article by Veterinary-Surgeon Hutcheon (appearing in the *Cape Agricultural Journal* of January 17th) the reference to "Preventives" in dealing with Quarter-ill :—

The only preventives of Quarter-ill are a complete change of pasture and inocculation. Even if it is impracticable to remove the susceptible cattle to another farm, a change to a different part of the same farm, accompanied by a change of kraal as well, will often arrest the further spread of the disease.

Care should, however, be exercised not to remove any affected animal along with the herd, as that would tend to spread the infection. If it is impossible to arrange for a complete change of pasture, no time should be lost in getting all the young stock inocculated.

Previous to the discovery of inoculation by Arloing, Cornevin and Thomas, a considerable number of preventive remedies for this disease were practised by stock-farmers, and even by the Native tribes. Reasoning from the fact that the young stock which are rapidly improving in condition are the most susceptible to an attack of the disease, a large number of these preventive remedies took the form of measures for lowering the condition of the animal and reducing the richness of its blood, such as bleeding, purging, driving the animals violently for considerable distances, or swimming them through a river or large dam daily, turning them on to poor pasture, or in other ways reducing their allowance of food. "Want of exercise causes an accumulation of lactic acid in the muscles, this favours the germination of the spores." (Salmon.) Inserting a peg or seton in the dewlap is a preventive upon which great reliance is placed. In what manner this seton exercises its beneficial effects has never been properly explained. Many are of opinion that it is the means of introducing septic organisms which have an antagonistic action to the organisms of Quarter-evil. Be that as it may, a firm belief in the efficacy of setoning as a preventive of Quarter-evil was world-wide, and many still believe in its efficacy, notwithstanding that it has completely failed to justify that opinion when submitted to an experimental test. Others again placed great reliance on the introduction of certain medicinal or antidotal agents into the system of the animals to ward off the disease. The following amongst a host of others were largely used : the sulphite and hypo-sulphite of soda, and carbolic acid and its compounds. One writer pins his faith to madder, while another has equal confidence in saltpetre. There are many who believe in the efficacy of a lick made up of common salt, sulphur, copperas, lime and saltpetre, while others again pin their faith to the administration of Stockholm tar. Garlic is another remedy which is largely used in this Colony, not only as a preventive of sponsziekte, but of the majority of the specific diseases of stock, such as Rinderpest, Horse-sickness, &c. There are various methods of using the garlic. Some make a small pocket under the skin in the dewlap, and insert one or two of the bulblets in there, while others insert them into similar pockets under the skin in various parts of the body. Oil of garlic, like oil of mustard, is a germicide; it is also very volatile, permeating the whole system in addition to setting up severe local irritation. It is just possible, therefore, that garlic and some of the other popular remedies may exercise some preventive effect against Quarter-evil for a limited time. It is probable, however, that many of these popular remedies have established their reputation as preventives of the disease from the fact that, during certain years when the remedy has been resorted to, the disease did not occur, the local or general conditions not being favourable; and on other occasions it has ceased to spread owing to the presence of natural causes, concurrent with the application of a certain remedy, but few—if any—of these popular preventive remedies have stood the test of continued experience.

Quarter-evil exhibits certain peculiarities in respect to the manner in which it may appear and disappear amongst cattle on a farm. The disease sometimes appears with great virulence on a farm during one year, and it may then skip one to two years before it reappears. Further, cattle may have been grazing for six, nine, or twelve months on certain pastures without a single case of the disease

occurring, when it will appear suddenly, attacking the young stock in rapid succession. The cattle are then removed to another locality and the disease suddenly ceases. After an absence of one, two, or three months these cattle are brought back to the infected veld, and in the great majority of cases, with perfect impunity, no more cases occurring perhaps for many months. These facts indicate that there are certain local conditions which favour, or otherwise, the development of this disease, in addition to the presence of the spores in the soil. It is also very probable that the beneficial effect of the change upon the cattle themselves renders them less susceptible to the action of the spores of the disease when they return to the tainted pasture. MM. E. Leclainche and H. Vallée give a very clear explanation respecting the manner in which these influences favour or hinder the development of Quarter-evil. The conclusions arrived at by these savants are supported by a series of carefully-conducted experiments; for a description of these see *The Journal of Comparative Pathology and Therapeutics*, vol. xiii., parts 2 and 3. They say Quarter-evil is a disease in which the infection comes from the soil, causing disease only in certain conditions of susceptibility, and due to a sporulating organism. It is probable that the spore derived from the soil does not reach the body charged with toxin, and spores without toxin do not kill. The phagocytes—or living cells which are present in a.l healthy tissues, and whose main function is to absorb and destroy disease organisms—triumph rapidly over spores that have been deprived of their toxin. But if the spores are protected against the phagocytes by the properties of the toxin, the spores germinate at the place where they have been introduced, and infection takes place. The addition to the spore of lactic acid, potassium lactate, and the application of some simple traumatic injury will produce the same effect as the toxin, in preventing the action of the phagocytes on the spores. Spores that may safely be given in millions will kill with a dose ten times smaller, if one drop of lactic acid is added. The harmlessness of the spore by itself is not due to any attenuation of its virulence produced by heating or other means which deprives it of its toxin; this is shown by the fact that the addition of a certain quantity of toxin or lactic acid restores its virulence, and the pure spore then kills as rapidly as the fresh culture from which it was taken. This is clearly shown by the fact that if the spores are protected by purely mechanical means such as coagulated albumen from the destroying action of the phagocytes, they have time to germinate, and the evolution of the disease is only slightly retarded.

The occurrence of diverse forms of bacteria in the tumours of the disease also exerts an action that is sometimes favouring and sometimes hindering to the development of the disease. Every influence, therefore, which is capable of diminishing the vitality of the tissues and hindering the action of the phagocytes will facilitate the development of the spores, and permit them to manifest their virulence; and per contra, every influence which tends to increase the vitality of the tissues nd thereby favours activity of the phagocytes, will have a tendency to prevent the development of the disease.

If, however, we admit the influence of all these local conditions which under certain circumstances favour or hinder the development of Quarter-evil, are we justified in totally ignoring the temporary effects of many of the popular preventive remedies, which are artificially applied, because we cannot explain how they act?

POULTRY NOTES.

Shade is very necessary for poultry in hot weather. Heat affects them, and they often die by this cause alone. Shelter of some sort must be provided. A supply of fresh and clean water, which should be well shaded from the sun and kept as cool as possible, should always be available. There is no need for very large quantities, and 6 inch or 8 inch flower pots with a cork in the bottom serves the purpose of a water trough excellently; the water is kept cool and the evaporation is less than from a dish or pan.

Green food is a necessary ingredient as a diet for poultry, and it is specially so in hot weather as it is cooling to the blood. A patch of land should be specially devoted to the growth of such food for poultry. When no green stuff is available, give once a week a small quantity of Epsom salts which could be mixed in the water used to make up the soft food for the birds.

Young growing fowls should have a liberal diet containing plenty of bone-forming material which can be provided in the form of ground bone. Bone cutters can be purchased for from 30*s.* upwards, and well repay their cost. A good one is called "The Mann." This "cut green bone" is just what is required for pullets that have begun to lay early; it provides much egg-forming food and lessens the drain on the immature system.

As most people shrink from operations, the following method of curing cup-bound fowls (says a correspondent in the *Queensland Agricultural Journal*) will be read with interest:—Get a piece of window-glass or any ordinary glass and put it on the fire till it bends; then take it out and plunge it into cold water, when it will crumble up quite easily with the tap of the hammer. It makes good sharp girt, but it will not injure the cup in the least. Give the sick bird 1½ tea spoons of this and follow up with a tea spoon of salad oil. Now start working the cup gently with the hand and continue doing so till it is quite pliable in every part. Shut the bird up with nothing to eat, and if its cup is not empty in twelve hours, repeat the dose and keep without food until it is. The secoed dose will not fail.

BACTERIA AND THE DAIRY.

(*By H. Potts, Dairy Expert, Department of Agriculture, Victoria.*)

Bacteriology, whilst one of the youngest sciences, already occupies a prominent place in all the laboratories of the world. Pathologists, botan-

ists, chemists, brewers, dairymen, agriculturists, tobacco manufacturers, tanners, and others are engaged in unravelling the mysteries of this subject in combating disease and prosecuting important manufactures. Some of the organisms which gave it its name were seen as long ago as 1675—when Anton Leeuwenhoeck, a Dutch philosopher, not only made his microscope—a simple one—but applied it to such good purpose, that he discovered and described organisms which are now known as bacteria, bacilli, spirilla, and micrococci. He called them animalculæ, but he failed to discover their object in nature. Subsequently original research was conducted by Muller, Needham, Spallanzani, Schwann, and Davaine. The real initiation of the science dates its birth to Louis Pasteur's classic researches upon fermentation. The question of spontaneous generation and its obscure origin had occupied the attention of great minds, including Liebig. His masterly essay on fermentation with his chemical theory received a rude shock when Pasteur gave forth his startling proclamation in 1860. "No fermentation without germ life." Robert Koch gave the science a lasting stimulus in 1882 by the discovery of the tubercle bacillus. Baron Lister, the brilliant surgeon, expressly thanked Pasteur for having given him the only principle which could have conducted the antiseptic system of surgery to a successful issue, and through which he is justly accredited with having saved more lives than were lost in the Franco-German war. Owing to the prominence given to bacteriology in medicine and surgery, a belief has been engendered that germs are only associated with these sciences; but the army of earnest workers now engaged in the elucidation of their life history proves that the ubiquitous microbe is omnipresent. We know now without it the world becomes uninhabitable. In air, water, and soil we find it busily engaged in varied forms on nature's phenomena.

To classify them into four great groups. First, the useful organisms.—The application of these to the arts and manufactures are daily becoming better defined, and are exerting a wonderful influence. In commercial life, we find the correct fermentation of wines and beers, and all the "diseases" to which these beverages are liable are due to microbes. The successful development of flavor in butter and the ripening of cheese, the flavoring of tobacco, the curing of opium, the manufacture of Indigo, the tanning of leather, the production of yeast for bread-making, "retting" in the jute and linen trades, and other processes depend upon the use of the most desirable forms of these useful minute organisms; the agriculturalist in the nitrification of his soil, the reduction of nitrogenous manures to a condition in which they can be utilised by crops, the sprouting of his seeds, and the success of his hay-stack and silo, is dependent upon the behavior of friendly bacteria. Second, the putrefaction of hostile bacterias.—In this section we find the putrefactive organisms associated with filth and decomposition. They habitually flourish in darkness, organic matter whether it be a dead body or vegetable material is reduced by them to original constituents or elements. By this invasion, they interfere with the progress of useful processes, check suitable fermentations and changes, impart false flavors and aromas, and interfere with the functions of the desirable organisms. Third, the pathogenic or disease-producing micro-organisms.—With this large and influential section we find eminent scientists and medical men have prosecuted the most profound researches through the instrumentality of which we find pathogenic germs are responsible for such diseases as tuberculosis (consumption), small-pox, diphtheria, typhoid fever, measles, cholera, hydrophobia (lock-jaw), anthrax, and bubonic plague. Fourth, the unknown families of bacteria.—We are cognisant that there are numberless species of organisms distributed throughout the world of life whose identity and functions are not yet discovered. So far, only about 700 species have been isolated, named, and their life histories and characteristics recorded. To attempt to give an adequate conception of the vast and ramifying influences exerted by bacteria would occupy too much space, I must therefore confine myself to the subject, as it effects the dairying industry.—*The Station, Farm and Dairy.*

(*To be concluded.*)

INTRODUCTION TO ENTOMOLOGY.

(MISS ELEANOR A. ORMEROD.)

Pupa (*Chrysalis*).—It is much to be regretted that we have no generally-adopted word, excepting "chrysalis" (which is commonly used in the case of Butterflies or Moths), to describe the second stage of insect life in which it is changing from the state of larva to that of the complete insect.

Whilst in this condition it is for the most part without power of feeding and perfectly inactive, lying (as in the case of Beetles,—the common Cockchafer for instance,—Bees and Wasps, and some others) with limbs in sheaths folded beneath the breast and body, or (as with Butterflies and Moths) protected by a hardened coating secreted by the pores of the creature within, when it casts its last larval skin. The method of this change may be easily observed in the case of the caterpillar of the Peacock Butterfly, which fastens itself by the tail, and then (after its black and silver-spotted skin has cracked) by infinite wriggling and struggling passes this cast-off skin backward, till it is pressed together at the tip of the tail, and the creature from within appears in its new form as a bright green chrysalis or pupa. It is covered with a moist gummy exudation, which quickly hardens and forms a protecting coat, and in due time (if left unharmed) the butterfly inside would crack through this and appear from within the case; but if it is wished to observe that the beginning of the change to the Butterfly form has taken place already, one of these chrysalids may be dropped into a little warm turpentine, or turpentine and Canada balsam, directly the caterpillar skin has been cast; this will soften the gummy coating just mentioned, and the limbs of the future Butterfly will be seen. In some cases the change takes place (as with

various but not all kinds of Flies) in the hardened skin of the maggot, which may be called a "Fly-case"; and in some (as with Plant Bugs, Aphides or Green Fly, Grasshoppers, and some others) this state of pupa is an active one, in which they move and feed and resemble the perfect insect, excepting in having more or less rudimentary wings or wing-cases. When the time for development has come, the pupa (if it is one of the active forms, as of a Grasshopper, for instance) may be seen looking heavy and stupid; presently the skin of the back splits lengthwise, and through the opening the perfect insect slowly makes its way out of the pupal skin, carefully drawing one limb after another from its precisely-fitting case, the longhind legs the last, till (in the instance observed, in twenty minutes) the perfect Grasshopper stands by the side of the film of its former self. Flies press out one end of the fly-case, or crack it open, or leave the sheaths of the limbs and body behind, and Beetles and Wasps cast the film from their limbs; Butterflies and Moths crack open the chrysalis-case, and after a short time (during which the wings that had lain undeveloped are expanding) they appear of their full size. The insect is now fully formed; it will grow no more; its internal, as well as external, structure is complete; and it is what is known scientifically as the imago.

Imago (Beetle, Butterfly, Wasp, Fly, &c.) This is defined as an animal formed of a series of thirteen rings or segments, breathing by means of tubes (tracheae) which convey the air from pores in the sides throughout the system, and divided into three chief portions. Of these the first is the head, furnished with horns (antennæ), a mouth (differing very much in form in different kinds of insects), large compound eyes (which consist of many small ones formed into a convex mass on each side of the head), and frequently two or three simple eyes on the top.

The second portion (called the thorax, or sometimes the "trunk") is formed of three rings bearing a pair of legs attached to each, and having usually a pair of wings on the second and third of the rings; but sometimes the wings are wanting, sometimes there is only one pair.

The third portion (called the abdomen) is formed of the remaining nine rings, and contains the organs of reproduction and most of those of digestion. Insects in this perfect state are of two sexes, male and female; in some instances (as with Wasps and some others) there are imperfectly-developed females known as "penters."

After the insect—whether Beetle, Butterfly, Fly, or other kind—has come from its chrysalis or fly-case (that is, from the pupa), and its limbs have expanded, it is complete, and its remaining work is to support life until it has propagated its species. Usually pairing soon takes place, and the male dies; but the female has great tenacity of life until she has laid her eggs.

The length of life, however, is various; in some instances a few days, or even hours, is the extent; in others the insects "hybernate," that is, find some shelter in which they pass the winter, and from which they reappear with the return of warmth and sunshine.

INOCULATION AGAINST RINDERPEST.

From Dr. Alfred Lingard, M.B., M.S., D.P.H., Imperial Bacteriologist—To the Secretary to the Director-General. India Medical Service—(No. 8, dated Mukhtesar, Naini Tal District, the 5th January 1901.)

As desired by his Honour the Lieutenant-Governor of these Provinces during his visit to Mukhtesar in October-November last to put forward a concise statement of success obtained with serum inoculations and modes of its operation, with a view to give it publicity and persuade the leading zemindars and talukdars to give prompt information concerning outbreaks of rinderpest, so that they may have their cattle inoculated before its ravages be felt, I have the honour to summarize in the following paragraphs the results obtained up to date, and request you to be good enough to submit this letter to the Chief Secretary to the Government of the North-West Provinces and Oudh:—

Serum Simultaneous Method.—This method, which has been very widely adopted in South Africa with most encouraging results, consists in injecting a small dose of protective serum on one side of the animal's body, and at the same time a small dose of virulent rinderpest blood on the opposite side. A mild form of the disease is produced in 90 per cent of the animals, with a loss only of one-half per cent and with the production of a permanent immunity, while the other 10 per cent are also protected for some months, even though they fail to re-act to the inoculation. In this connection I would point out that when a totally unprotected animal is subcutaneously inoculated with the most virulent blood, it shows no symptoms of disease previous to the 3rd, 4th or 5th day following inoculation, and then only does the temperature begin to rise. It is not until at least three days later, *viz.*, the 6th, 7th to 8th day that any symptoms of rinderpest become manifest. Therefore, in practical field inoculations it has to be first ascertained whether the disease is already incubating in the animals about to be inoculated, as in such cases the simultaneous method of inoculation should not be employed, but serum alone injected in large quantities should diarrhœa not yet have supervened. If this latter symptom should have already made its appearance nothing can save the affected animal.

Experiments in the Laboratory.—The experiments carried out with the above mentioned method in this Laboratory prove that the animals which show temperature reactions with fairly marked symptoms are immuned for upwards of one year, and there is no reason to doubt that it will last for a much longer time, if not for the life of the animals. On the other hand, the animals showing no temperature reaction or symptoms of the disease, partly due to the large doses of serum used, may wear off their immunity earlier than those which reached to the simultaneous method, and this difficulty can be got over by reinoculating those animals, which have not reached within a week or ten days of the simultaneous injection with a second dose of from 1 to 10 c.c. of virulent blood.

Results in Field Inoculations.—The inoculation carried out by the serum manufactured at this Laboratory in Bareilly, Alighar, Bulandshahr, and Dehra districts gave eminently successful results, and Mr. Holmes, in his report from Madras, states: "Out of 339 bullocks inoculated, nine died, but these deaths were attributed to old age and debilitated conditions and to the fact that the animals were suffering from rinderpest previous to inoculation. I do not consider that any of the deaths occurred as a direct result of inoculation. I think it is safe to say that, as a result of these inoculations, rinderpest was at once checked and a heavy loss averted among the cattle."

By referring to Table C. of the Assistant to the Inspector-General, Civil Veterinary Department's annual report for the year 1899-1900, we find that out of 1,730 animals inoculated by the above method, only three died after inoculation.

Hill Cattle.—There is a great difference in the dose of serum required for the inoculation of hill cattle as compared with that which is safe in plains animals. Notwithstanding that the serum simultaneous method by itself has not been found to be reliable in this particular breed, yet on reinoculating these animals with from 1 to 10 c. c. of virulent blood during the seven or eight days following the injection by the simultaneous method, protection has been brought about and an active immunity conferred.

Serum Alone.—The use of serum alone causes no reactionary fever, and it affords immediate full immunity and is very useful in the case of dairy animals and pregnant cows, where it is desirable that the milk supply should not be interfered with, and no cases of abortion take place. The temporary immunity given by injecting with serum alone is sufficient to protect the animals throughout an outbreak. The experiments carried out at Mukhtesar proved that the animals injected with 10, 20, 50, 100, and 150 c.c. per 600 lbs. body weight, were found immune on the 43rd, 76th, 103rd, and 164th days respectively, after serum injections, and in each case when tested by the introduction of virulent blood subcutaneously only a slight temperature reaction followed, clearly showing that the animals submitted to the above test were perfectly protected and would remain so for a much longer period than those stated above.

Manufacture of Serum.—During the year 1900, 464,765 c.c. of protective rinderpest serum were produced at Mukhtesar and 119,880 c.c. have been issued to the Veterinary Superintendents of differents Provinces in India. At the present time we have 33,673 ones tested and ready for despatch on receipt of a telegram, but in addition some 50,003 are already in stock and only need testing, a matter of two weeks' duration. The manufacture of rinderpest protective serum will be continued at the Imperial Bacteriological Laboratory, and a depôt might be opened in the North-Western Provinces, as has been arranged for by Government for the supply of Bombay, Bengal, and other provinces, so that the serum may be readily obtained when required.

THE HONEY-BEE—ITS LIFE HISTORY.

Some little attention has begun to be given to the domestication of the honey-bee in Ceylon and an account of its life-history—so full of romance—should prove of interest to our readers. We take the liberty of making use of a short but full account from the pen of Mr. Helms in the Journal of the Agricultural Department of Western Australia for February, as more suitable to the pages of a little monthly than a longer account would be. Indeed, as the writer of the article remarks by way of preface, to become expert in the art of bee culture, it is necessary to become thoroughly acquainted with the life-history of the insect, as also with the special functions assigned to the organs of the structurally varying members of a bee-family. Without a clear conception of the phases of life and the interaction of the differently-constructed individuals upon the whole community, a bee-keeper will for ever remain a mere dabbler, and will always be liable to bungling.

1. *The different members constituting a Colony.*—A community of bees is variously termed a colony, swarm, and frequently also stock or hive. The two latter terms apply more correctly to the artificial dwellings of the bee, but by conventional habit of speech it is understood to mean a large assemblage of the insects as well. A colony is in reality a large family including many thousand members, most of which are sisters, and the offspring of the same mother. But periodically there are also male bees met with among them. This, however, generally only occurs in the early part of the summer, when through increased vitality and impulse arises in the family for a portion of it to migrate, which is commonly known as swarming fever. Such migratory instinct is much stimulated by a rapid increase, when, in order to avoid over-population, it becomes necessary for a number to leave the hive and seek a new home. At such time males are produced for the fertilisation of the future mothers, which are still unhatched when the old one leaves with the swarm.

With the honey-bee three distinct physiologically differentiated creatures are necessary to propagate the race. Still, as with other animals, only two sexes occur. The vast number of bees seen constantly emerging from and entering the hive are neuters—an application objected to by many writers as not being strictly correct. Those so-called neuters are the working masses of the community, and are in reality females with aborted sexual organs. Through some extraordinary influence acting upon the immature young, their sexual organs remain only partially developed, and in their place they become possessed of certain physical features not found in the true sexes. Although this abortion of the sexual organs has made it impossible for these bees to be themselves reproductive, their maternal instinct is no wise diminished, and is, in fact, developed to an extraordinary degree. Were it not for their devoted attention to the young, the community could not prosper. The three different bees are known as the queen, drone, and worker. The

queen is a perfect female as regards her sexual organs. The drone is in the same manner a male. The worker or so-called neuter is sexually imperfectly developed female.

The Queen, owing to her great laying power, is generally regarded as the most important member. It is true a fertile queen may soon increase the number of workers, and transform a weak into a prosperous colony, but she could not have done this without having been first fertilised by the drone. Nor could the brood be reared without the help of the foster mothers, the workers. When it is considered how the different elements which constitute a colony depend upon each other, and how their functions interest with one another, it becomes obvious that none deserve to be called the "most important." Without the one the other could not exist for long, only the male members may be dispensed with periodically, because their influence, when once manifested, is of extraordinary duration.

The Queen.

The interesting member of a bee colony, now generally known as queen, was formerly also called king or leader (Weisel or Weiser, German). This was before her sex had been recognised, and no doubt arose from the fact that she appears singly among a great number of other bees and receives considerable attention from them. She is, in reality, during the early part of her life, the sister of the workers and drones, and later the mother of all who surround her. Her true position is that of mother-bee, and her importance begins after she has been fertilised. The term king originated in antique times, when she was thought to be a male, and the supposition that she possessed monarchial powers and influence gave rise to this name. In no sense, however, does she exert monarchial power, nor can she be called a leader, for she does not lead, but, on the contrary, is led by her children. They well knowing that upon her depends the reproduction of their numbers, and consequently the future welfare of their family, tend to all her wants and display the greatest filial attachment towards her. A number of workers constantly surround her, and according to the desire of greater or lesser increase, which is regulated by the flows of nectar and the season, she is suppulied more or less abundantly with food. Consternation seizes the offspring should the mother be lost through death or accident. Soon after emerging from the cell the young queen leaves the hive a few times on fine days and circles about over it for the purpose of getting acquainted with the surroundings, and then, under the sexual instinct, flies off one warm afternoon to meet a drone. The mating flight generally takes place on the fourth day after the queen has emerged from the cell, but sometimes earlier, and frequently later, if prevented by inclemency of the weather. If delayed for more than 20 days fertilisation rarely takes place, and in that case the queen becoms a "drone-mother." She is generally successful in accomplishing her desire, and when she returns, after her nuptial excursions, she does not voluntarily leave the hive again. After coition her ovaries develop rapidly, and in a few days she begins to lay. The power of oviposition grows considerably for some time, and when it is at its height she may lay as many as 3,000 eggs daily. Considering that the average life of a queen is about three years, and sometimes extends to over five, it is not impossible that she may lay over a million of eggs during her lifetime. She is one of the most prolific insects known. The laying of eggs is the important function of the queen.

(To be continued.)